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Industrial Photography

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Allis-Chalmers films reach 7,000,000 . . . page 18
Wind-tunnel photography at Princeton . . . page 20
Drawing revisions through xerography . . . page 22
Microrecording: A Special Section . . . page 31

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Garrick keeps pace with the steady development of the photographic industry. Close contact with the leading makers of photographic equipment and supplies insures that the newest and finest products developed for use in industrial and commercial photography are made available to you at the earliest possible moment. You work with the best . . . to increase efficiency and ease of production in your photographic operations.

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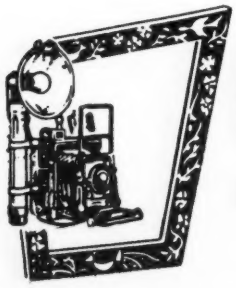

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More Features... Greater Value

Than Any Enlarger Selling Up to ~~$230.00~~

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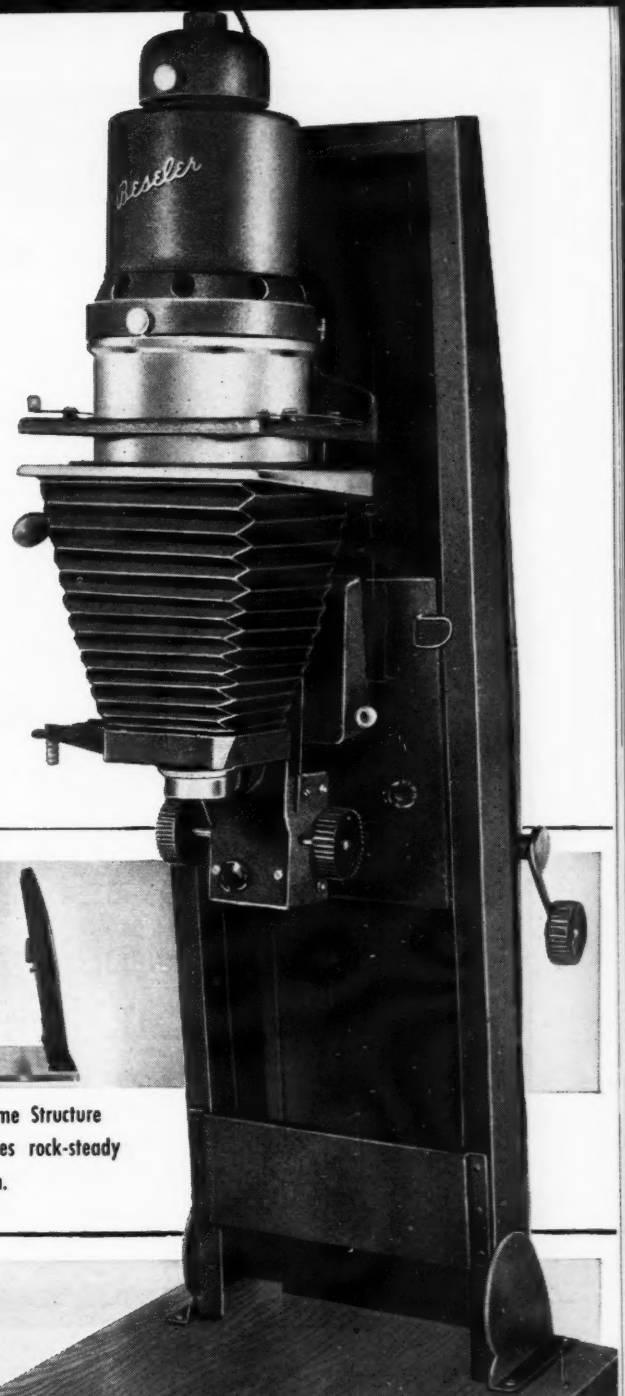

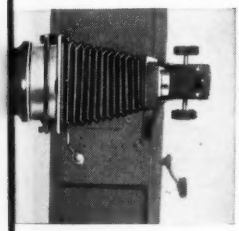

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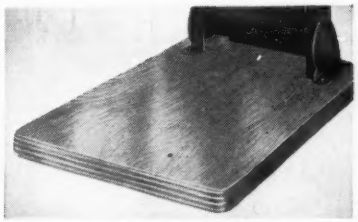
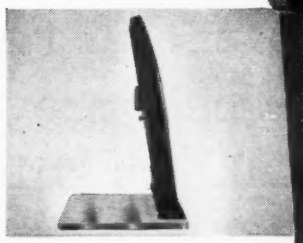


New Obstruction-Free Baseboard, constructed of 1⅜" laminated plywood.



New Frame Structure guarantees rock-steady operation.

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counter balance provides
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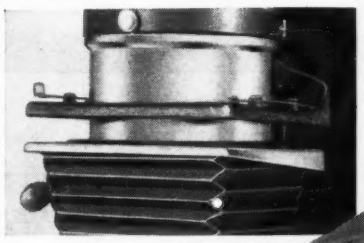
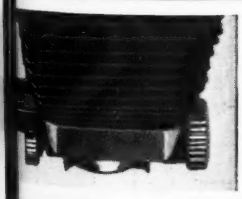


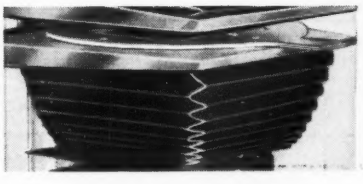
2-6½" Condensers...enlargements from 8mm (Minox) to 4" x 5" negatives without changing, storing or handling costly condensers.

Visit your Beseler Franchised Dealer today. SEE for yourself why Beseler is the enlarger for photographers of today . . . tomorrow . . . and years to come.

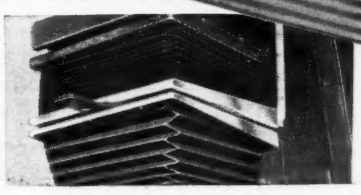
Write for complete descriptive literature.



n Sliding Filter Drawer pro-
quick, proper Filter Posi-



Controlled Tension Negative Stage locks simply . . . swiftly . . . into a light-tight unit.



Optional accessory—Upper Bellows Assembly for optimum illumination of any size negative from Minox to 4" x 5".

The new Beseler 45H accepts all standard Beseler "45" accessories.

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. . . for more details circle 515, page 81

Introducing the new

FILMOSOUND SPECIALIST

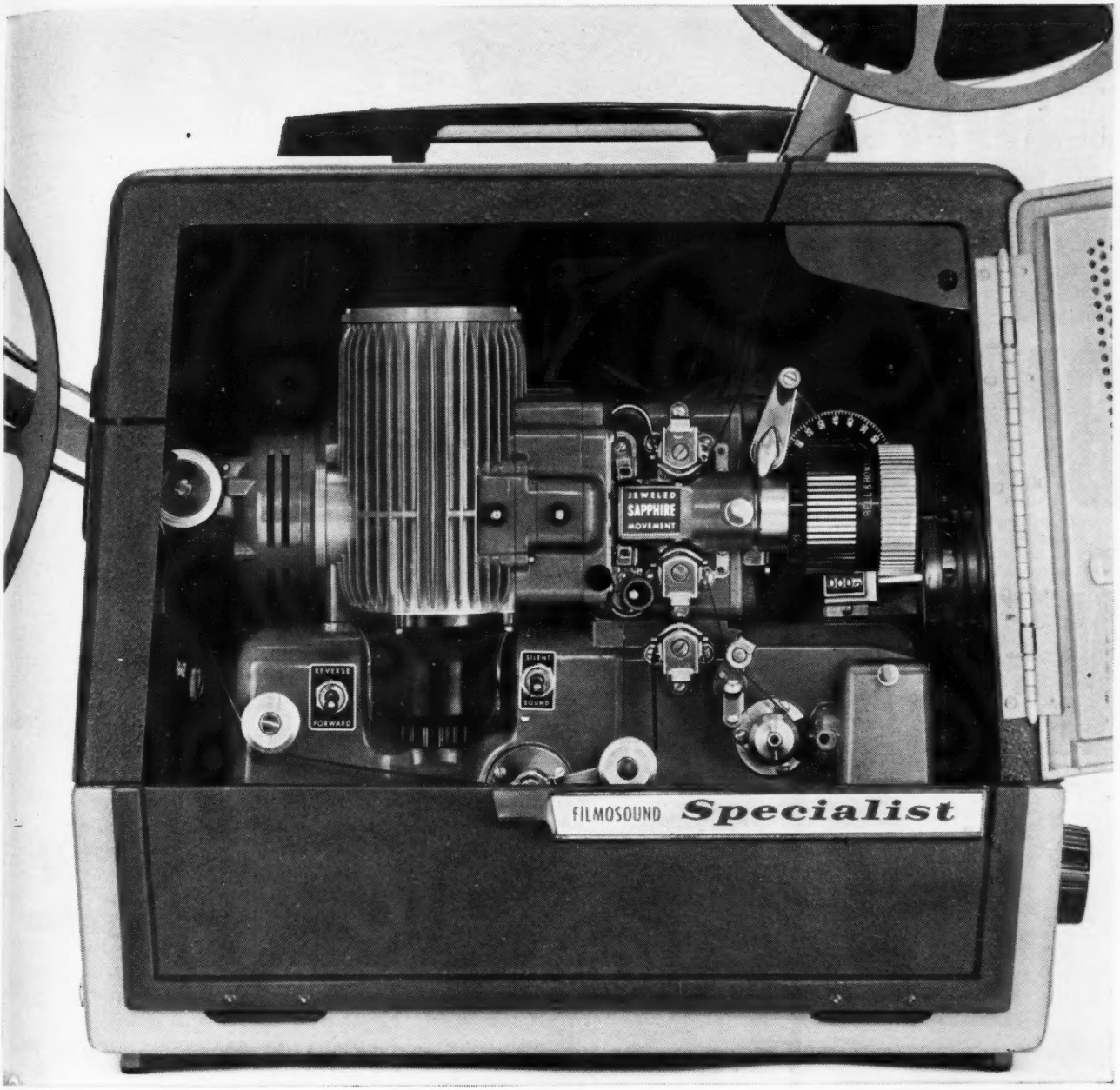
399

This is the only sound projector that "zooms" the picture to fit the screen. It reverses for review...threads in seconds...shows still pictures...requires no oiling. It's the newest achievement in sight and sound! See it in action!

The "399" is the most versatile 16mm sound projector available today. As the chart below shows, it offers more advanced features, more exclusive features, than any other projector. In over-all quality it has no parallel, yet its basic price is only $499.95. It is the finest value of all sound projectors. Ask your A-V dealer to demonstrate, or write Bell & Howell Company, 7164 McCormick Road, Chicago, Illinois.

PROJECTOR	ZOOM LENS	FIVE SAPPHIRE MOVEMENT	ELECTRICAL REVERSE	BRILLIANT STILL PICTURES	FACTORY SEALED LUBRICATION	AUTOMATIC REWIND RELEASE	SINGLE FRAME DRIVE AND COUNTER	TOP MOUNTED REELS	HOUR METER	AUTOMATIC LOOP SETTER
399 SPECIALIST	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BRAND A	No	No	Yes	No	No	No	No	No	No	No
BRAND B	No	No	No	No	Yes	No	No	No	No	No
BRAND C	No	No	Yes	No	Yes	No	No	Yes	No	No
BRAND D	No	No	Yes	No	Yes	No	No	No	No	No

1. *Exclusi* adjusts pic moving th different si
2. *Sapphi* points deli of trouble-
3. *Reversi* instruction then revers
4. *Rewind* projector f Extraordin hour's show



1. *Exclusive new "zoom" lens** (f/1.6) adjusts picture size to fit screen without moving the projector. One lens serves for different size rooms.

2. *Sapphire parts* at five film handling points deliver 400% longer life . . . years of trouble-free service.

3. *Reverse operation* for more effective instruction. Operator can stop, review, then reverse and view again.

4. *Rewind release* automatically sets projector for "forward" after rewinding. Extraordinarily fast, 399 rewinds full hour's show in 2 minutes.

5. *Still picture clutch* lets you stop film on single frame for indefinite period.

6. *"Cold Glass" heat filter** gives 7 times brighter still picture image.

7. *Single frame drive** lets you advance or reverse, frame by frame, for slow motion study and discussion.

8. *Frame counter** lets you measure elapsed time for any sequence.

9. *Factory sealed lubrication* eliminates need for oiling.

10. *Automatic loop setter** eliminates "fluttering;" reforms loops without interrupting show.

11. *Hour meter** records running time; aids scheduling.

12. *Threading* is so simple that even a child can do it.

13. *Top mounted reels* let you set up on any table or desk without dangerous overhang.

14. *Powerful 15 watt amplifier* for full volume in large auditoriums. Will power 2 large speakers.

15. *Convenient self-contained* speaker can play within case or from any point in the room.

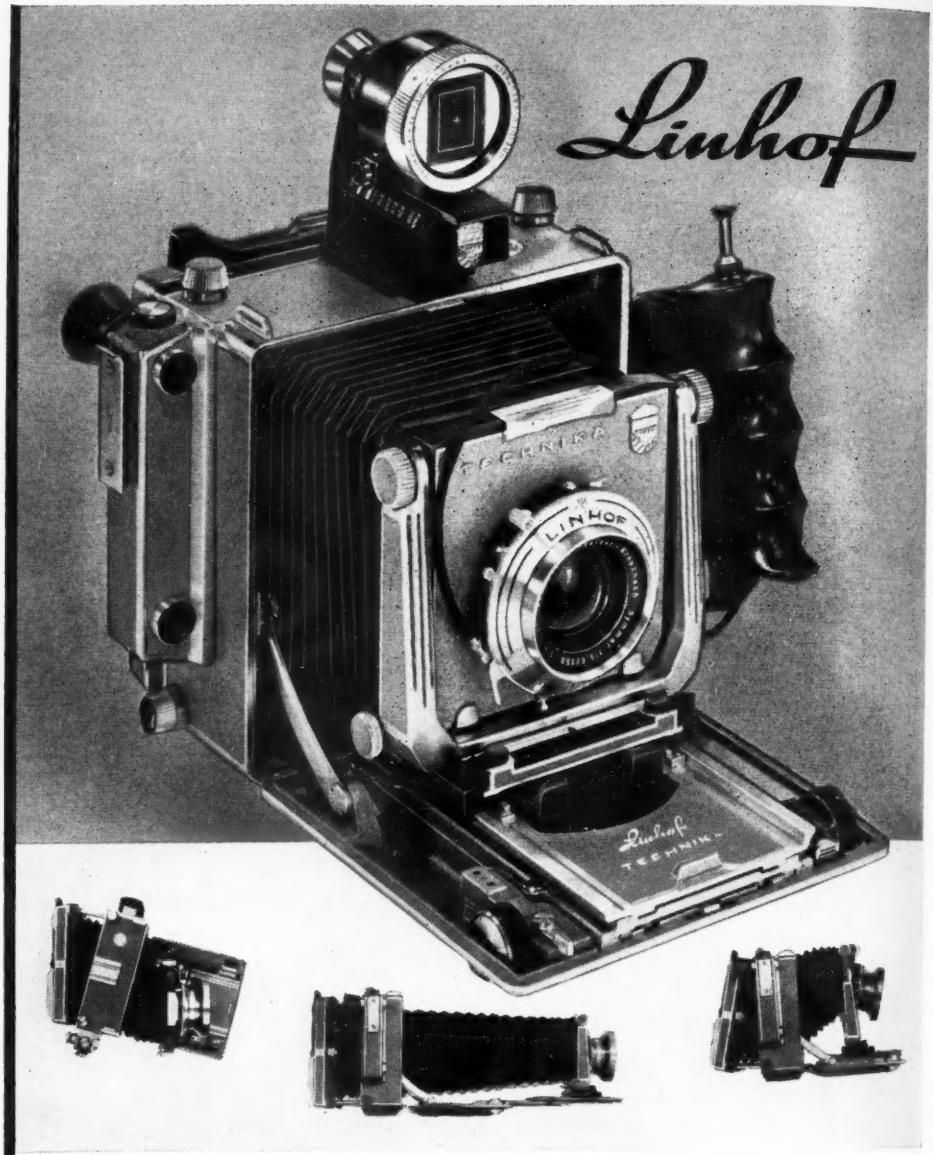
**Optional features*

FINER PRODUCTS THROUGH IMAGINATION

Bell & Howell

. . . for more details circle 514, page 81

WHY BUY 2 WHEN ONE WILL DO?



In photography—as in other crafts—the right tool makes for easier work, for more economical operation, for better results.

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Read GROSSBILD TECHNIK magazine and LINHOF PRACTICE, the encyclopedia of large-format photography.

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Industrial Photography

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APRIL, 1958

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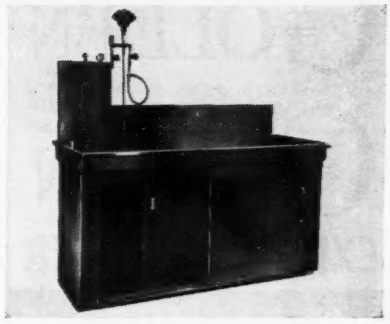
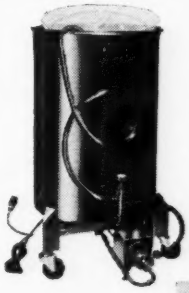
FILM PROCESSING STAINLESS STEEL EQUIPMENT



SINKS . . . 316 Stainless Steel construction, heliarc welded, corrosion proof. Fisher sinks are available in any size, for any job, there's one to meet your lab specifications. Curve clean corners, die sumped drain outlet, siphon drain adjustable stainless steel levelling screws and insulating undercoating are other sink features.

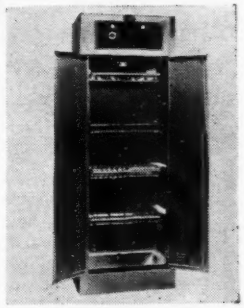


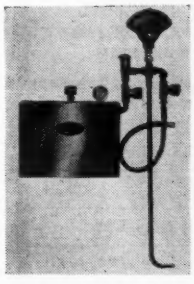
JET MIXER

This stainless steel unit pumps, mixes and delivers chemicals. 3-way utility unit has a storage tank, mixing motor, distribution line, all compactly built and carried on a noiseless girder type dolly. 10-25-50 gal. cap.

FILM DRYER

The universal all film dryer has been designed to meet the requirements of the industrial, commercial and professional laboratories. The unit operates rapidly, thoroughly and safely. Your assurance of peak efficiency. Size 24" x 16" height 82".





TEMPERATURE CONTROL

Fisher designed temperature controls are dependable, accurate and ruggedly constructed for long life. Will deliver 6-125 gal. water per min. at prescribed temp. Compact and efficient 23" long removable ⅝" stainless steel tube delivers water at maximum velocity. Weight 15½ lbs. Stainless steel cabinet meas. 13" x 11½" x 3".

Fisher Photographic Processing Equipment is designed to increase the efficiency of every operation in your lab... If you have a problem, call an experienced Fisher photo expert.

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THE GREAT NEW

GOLDEN CROWN

EXPOSURE METER

EXACT LENS SETTING FOR PERFECTLY EXPOSED PICTURES

STILL • MOVIE • POLAROID LAND
STEREO • COLOR • BLACK & WHITE

Superior in sensitivity and accuracy, this superb new meter is made to order for industrial photography. No film is too fast for it, no light too dim for it. And it's one of the easiest meters to use — no calculations to make, nothing to remember, pushbutton settings, instantaneous readings.

Compare its features and its performance, and you'll see why the G-E Golden Crown sets a new standard for versatility and value:

Sensitivity range	6 to 25,600 foot-candles (from 0.08 with Dynacell)
Film exposure index range	.1 to 20,000 ASA
Shutter Speed range	120 to 1/32,000 seconds
Movie settings	8 to 128 f.p.s.
f/stop range	f/1 to f.45
Exposure Value settings	1 to 20
Polaroid Land settings	1 to 9

For further information write: Section 583.109, Instrument Dept., General Electric Company, 40 Federal St., West Lynn, Mass.

Progress Is Our Most Important Product

GENERAL ELECTRIC

. . . for more details circle 547, page 81

Editor's Mail

STAN HOCHMAN, Editor

Commends Stanton Article

I think Earl Stanton's article on silk screen reproduction that appeared in your February issue was the best I have ever read on the subject. — Buray Robertson, Robertson Commercial & Industrial Photography, Greenville, Texas.

We Help Solve Problem

I can thank INDUSTRIAL PHOTOGRAPHY for helping us solve the knotty problem of getting numerous duplicates of color transparencies inexpensively. I read one of your "Ingenious Practices" items about a copying box using a strobe light (November, 1956), and made two here at the plant. I have succeeded in getting some excellent copies. — Arthur L. Schoeni, Chance Vought Aircraft, Dallas, Texas.

High Intensity Light

I am impressed with the progress of hi-speed emulsions and consequent step-up in processing solutions geared up to 5,000 ASA ratings. I am also aware of the fact that arc light can easily be checked for its constancy in both intensity and color quality by means of an exposure meter through red and ultraviolet filters. To measure the ultraviolet, a No. 5970 Corning Glass filter is recommended.

Would it also be feasible to measure in foot candles the intensity of electromagnetic waves with wavelengths of 300 to 400 millimicrons (ultraviolet range)? Briefly, our "light" or radiation source is emitted via a cathode ray tube onto a spectroscopic photosensitized plate (glass plate E.K. #103a-J) and I am wondering whether or not measurement of this intense radiation could be determined with photometric or photo-electric apparatus (quartz spectrophotometer) in order to establish a more accurate *f*/ setting and control of the intense light source, and with a view also of controlling the processing of the glass plate—Margaret Schell, Chicago Area Transportation Study.

Radiant energy in the ultraviolet region cannot be expressed in terms of foot candles because such units of measurement refer to luminous intensity based on visual response. We suggest a series of tests to determine optimum exposure conditions rather than attempt to calculate f-numbers, etc., from spectroradiometric data. However, if you want to pursue an objective approach, refer to the book entitled, "Measurement of Radiant Energy," edited by W. E. Forsythe, McGraw-Hill Book Company, 330 West 42nd Street, New York.

The 1957 Editorial Index for "Industrial Photography" is now ready for distribution.

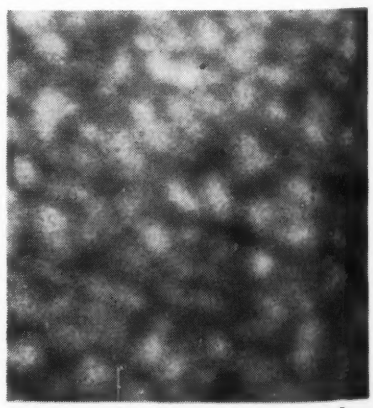
35mm Reprint

In a recent issue of INDUSTRIAL PHOTOGRAPHY you ran an article on the use of 35mm photography in industry. I should like to obtain a reprint of this article. — Clyde Sanborn, Clyde Sanborn Film Productions, Los Angeles, Calif.

Copy of October, 1957, issue has been mailed.

Photo of Sun

In your November, 1957 issue you mentioned in the column under "Instrumentation" that several photos of the sun had been



taken. May we see one?— Charles Moody, Cleveland, Ohio.

At your service, Mr. Moody. See cut.

AUTOMATIC TRI-FILM PROCESSOR

UP TO SIX FEET A MINUTE WITHOUT LOSS OF QUALITY!

THE transportable Mark 3 Automatic Tri-Film Processor develops and dries 16, 35 or 70 mm. film at 1½, 3 or 6 feet a minute! Four 400-ft. 16 mm. films can be handled simultaneously—or two 400-ft. 35 mm films—or one 400-ft. 70 mm length. The various film sizes are accommodated by simple adjustments of film separators. Separate temperature control of the processing solution is possible on each tank from 60 to 110 degrees F., within ± 1 degree. The latest high temperature chemical resistant plastics and Type 316 stainless steel are used in all chemical areas. Processing is controlled by a mechanical program unit after the film is loaded into the machine—no special "leader" or continuous tapes, chains or sprockets are used.

The need for stop baths and interbath rinses, normally required in many processes, is virtually eliminated because of a positive squeegee roller design.

A high-efficiency blower system and electrical heating ensure rapid drying in the machine. The Processor is perfect for newsreels, TV news on film, motion picture "rushes" in the field,—in all cases where speed plus quality are essential. Write for literature and quotations.

SPECIFICATIONS

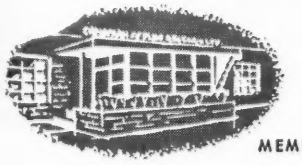
AUTOMATIC TRI-FILM PROCESSOR TYPE T246 Mk3

Size:	54" long, 22" wide, 51" high
Weight:	400 lbs.
Power Consumption:	5 KVA maximum single-phase: 110 volts, 45 amps, or according to customer requirements
Process Capacity:	1 to 4 rolls 16 mm } length 1 or 2 rolls 35 mm } to 1 roll 70 mm } 400 ft.
Rate of Processing:	1½, 3 or 6 ft. per min.

Temperature-controlled solutions and dryer. Daylight operation except loading of film into magazine. Processes perforated or plain film.

Canadian Applied Research Limited

(formerly PSC Applied Research Limited)



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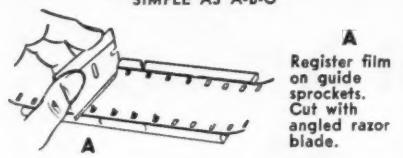
New F&B Butt-Splicing Block

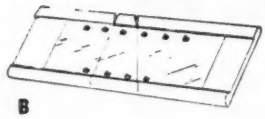
Now—a new, amazingly simple device for butt-splicing 16mm and 35mm film with Magic Mylar
SIMPLE AS A-B-C



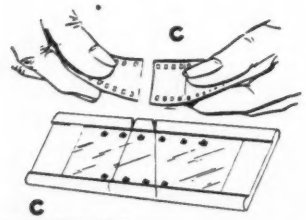
A
Register film on guide sprockets. Cut with angled razor blade.

A

B
Remove film, lay in Magic Mylar, sticky side up.



B



C

Order F&B Butt-Splicing Blocks Now.

C
Lay in film on top of Magic Mylar, carefully registering sprocket holes.

BUTT-SPLICE IS FINISHED!

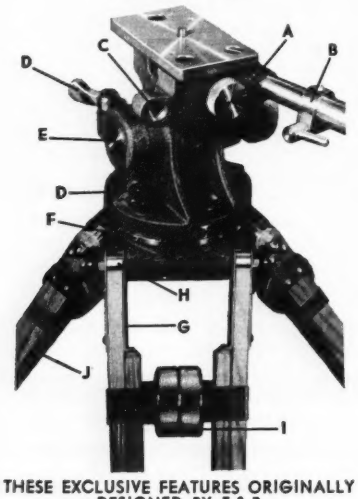
(For double-strength, you may place Magic Mylar on reverse side also)

Model B-16 for 16mm film	$9.50
Model B-35 for 35mm film	12.50
Model B-4 for ¼" magnetic tape	6.50
Model BSB—Combination block for 16mm, 35mm & ¼" tape	24.50

MAGIC "MYLAR"
Sprocketed Splicing Tape

16mm—Single Perf.	$5.00 Roll
16mm—Double Perf.	$6.00 Roll
35mm	$9.00 Roll

F&B PRO-CINE TRIPOD
MODEL 202



THESE EXCLUSIVE FEATURES ORIGINALLY DESIGNED BY F & B

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I—Single leg locking knobs—prevents bending & warping.
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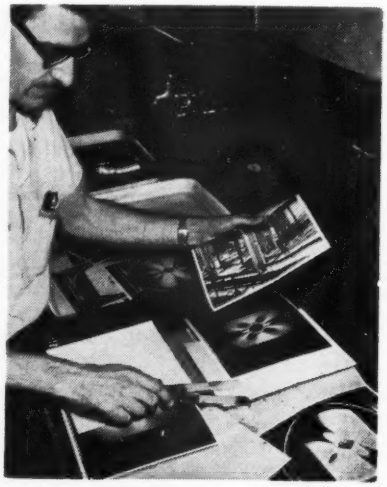
. . . for more details circle 543, page 81

Ingenious Practices

JAMES J. HUGHES, Associate Editor

Readers are invited to send their Ingenious Practices to James J. Hughes, INDUSTRIAL PHOTOGRAPHY, 10 East 40th Street, New York 16, New York. Payment of $10 will be made for acceptable items accompanied by photographs illustrating the techniques.

Fixing Prints



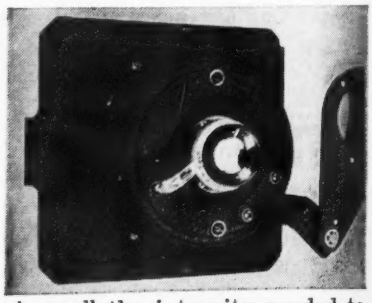
Placing alternate photo prints face up and face down in the hypo insures better fixing and washing. The emulsion side of the paper becomes "slippery" when wet, hence, the prints slip over each other when agitated in fixing bath and while washing in a rotating-type print washer. — *Don Shiner, Nescopeck, Pa.*

Clothes Pin Print Tongs

Spring clothes pins can very simply be converted into inexpensive and serviceable print tongs. This is done by merely reversing the spring as illustrated. Keep a separate one clamped to each tray to eliminate the possibility of contamination. They also make good film clips.—*Bil Toman, Palatine, Illinois.*

Spotlighting Enlarger Stops

Instead of looking for a flashlight whenever I wanted to see the enlarger stops in the dark, I took a ¼" plexiglas rod, bent it in hot water and inserted it in a ¼" hole drilled in the lens board. This makes a spotlight for the diaphragm scale that will not fog the projection paper, but

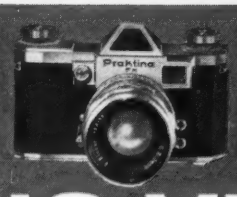


gives all the intensity needed to see the f-stops whenever the enlarger lamp is on—even though the lens is stopped completely down. For best results, polish both ends of the rod.—*Brent P. Bailey, Whittier, Calif.*

Cord Hanger

A very efficient cord hanger for lamp stands can be fashioned from a piece of coat hanger or

other heavy wire. The lamp cord can be hung out of the way while the stands are erect, and will be kept from underfoot while the stands are being moved.—*Ted Clouse, Newton, Iowa.*

THIS  IS VERSATILITY!

PRAKTINA® FX and integrated accessories – the most valued photographic team in industrial photography

Yes! The PRAKTINA FX *35mm Single-Lens Reflex* Camera and unique accessories, designed to meet the particular needs of Industry, Medicine and Science, are a harmonious working team—a functional unit.

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Push a single button of the Electric Motor, and the shutter is released, film advanced, frame counted and shutter wound for next exposure.

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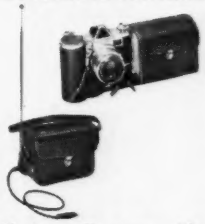
Used with the Electric or Spring Motor, or camera only, the 50-Foot Bulk Film Magazine is particularly useful for filming records and microfilming work.

SHOOT SUBJECTS EXTREMELY CLOSE-UP

The Extension Bellows & Tubes offer optical ranges from life size to more than 10-times magnification. Also available: the new Follow Focus Lens by Novoflex.

OPERATE THE PRAKTINA BY REMOTE CONTROL



Up to a mile away, without wires. The amazingly new Radina Radio Control Unit makes possible radio-controlled, remote operation, offering unlimited opportunities for industrial, medical, scientific, intelligence and surveillance shots.

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- Internal automatic diaphragm
- Track-Guide accepts interchangeable Penta-prism Eye-level Viewfinder, Waist-level Viewfinder, or Focusing Magnifying Eyepiece
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PRAKTINA FX is now available in many combinations with:

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Guarantee, Registration and Import Certificates furnished with each camera.

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. . . for more details circle 604, page 81

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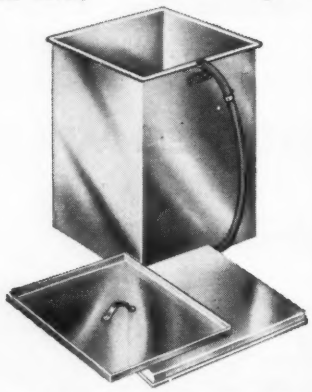

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. . . for more details circle 570, page 81

New Equipment and Materials

Keep posted on the latest developments in the photographic field. Each new product and supply item featured below has a key number. If you want more information on the subject — without any obligation — circle that same number on the Readers Inquiry Card on Page 81.

Lighting Torpedo 101

An underwater electronic lighting torpedo to help underwater photographers has been imported by *Cinefot International Corp.* The torpedo carries a light source, power plant and reflectors on a fully-contained basis, making it possible to add an additional artificial light source to underwater camera housings. The torpedoes can be equipped with propeller mechanisms (⅓ to 2 HP) to provide greater freedom of movement.

Printmaster 810 102

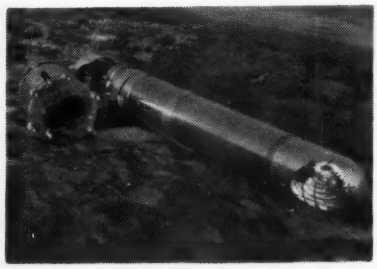
Printmaster 810 for the reproduction of engineering and architectural drawings has been introduced by the *Ozalid Division* of General Aniline and Film Corp. The 810 accommodates materials of any length and up to 42″ in width; its printing and developing speeds are synchronized to 40 feet per minute. A new design of the brush feed assembly, positioned well forward on the machine feed board, is said to eliminate cumbersome straightening operations on dog-eared or folded corners and to prevent curled edges and folded corners on originals badly fed into the machine. Dimensions: 61″ wide x 42″ deep x 61″ high.

Color Compensating Head 103

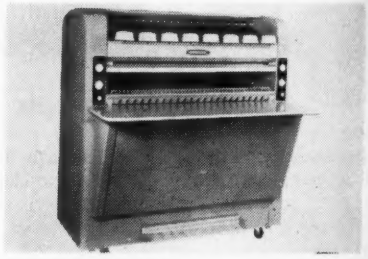
A hi-speed additive color compensating head to fit Bell & Howell continuous printer models D & E is available from *Fish-Schurman Corp.* The compact high-speed unit uses a single light source, a 1000 watt T-12 bulb. Adjustments are made in darkness by adjusting three knobs which provide for vertical, transverse and rotational motion of the bulb. Three electromechanically operated light valves provide color changes in 5 milliseconds. Separation of color bands is accomplished with little loss of light and without overlap.

Magna-Tech Reproducer 104

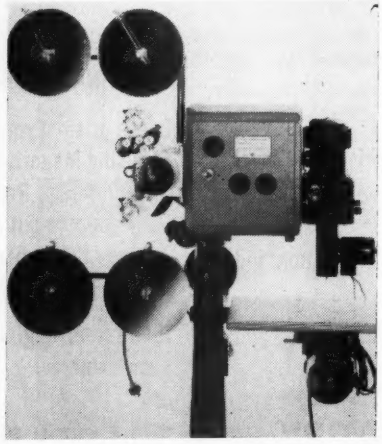
An optical and magnetic repro-



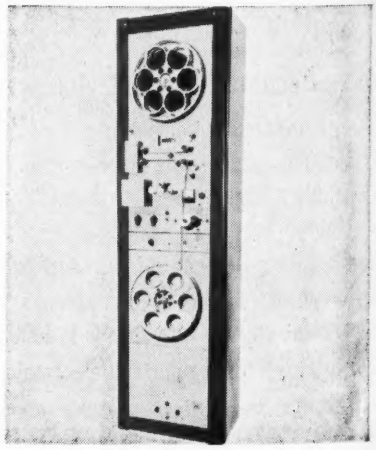
Lighting Torpedo See 101



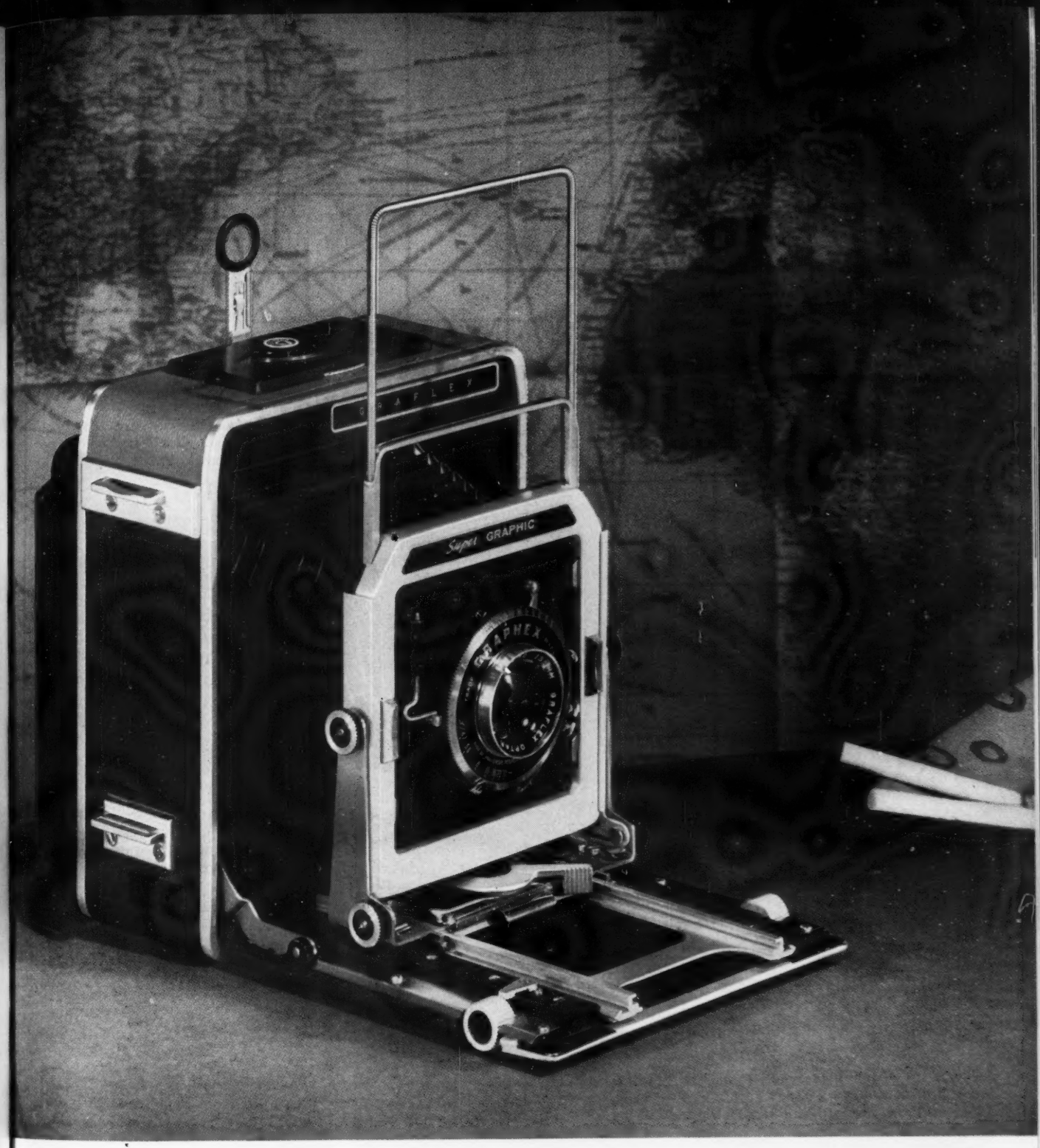
Printmaster 810 See 102



Color Printer Head See 103



Magna-Tech Reproducer See 104



Announcing the All New

SUPER GRAPHIC* 45

This great new camera is specifically designed for the industrial photographer. Though smaller than its predecessor, the Pacemaker Graphic, it has even greater versatility. It's a remarkable camera accomplishment.

New in appearance, in size, in convenience of handling and versatility, the Super Graphic permits the industrial photographer to accept new challenges. It is an advanced new tool for photographic achievement.

SEE NEXT TWO PAGES

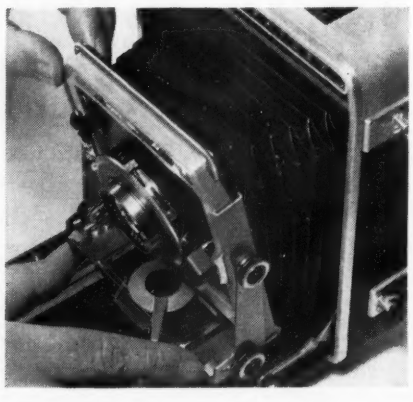
*Trade Mark

GRAFLEX® *Prize-Winning Cameras*

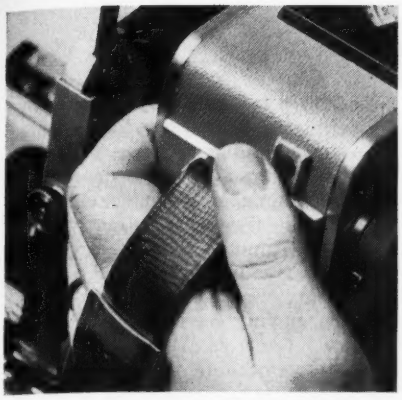
A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION GPE

Flexibility of all movements to adjust composition and depth of field. Front lens standard tilts forward and back, swings right and left, rises and shifts right and left.

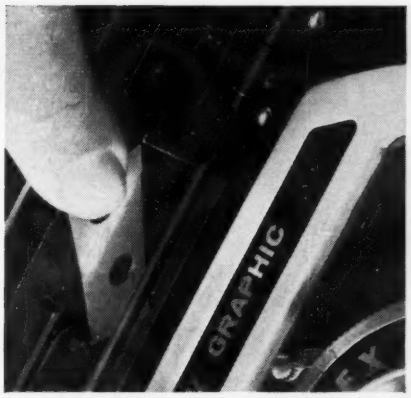
Forward tilting lensboard and drop bed combine for 30° tilt. Increases apparent depth of field when taking pictures from a balcony, down a flight of stairs or in similar situations. Drop bed also accommodates wide angle lenses.



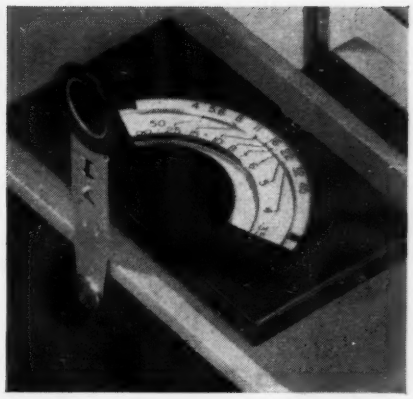
Lateral swing increases apparent depth of field when photographing some types of subjects. Can be used in combination with all other tilts, swings and shifts to correct optical distortion, parallelism and composition.



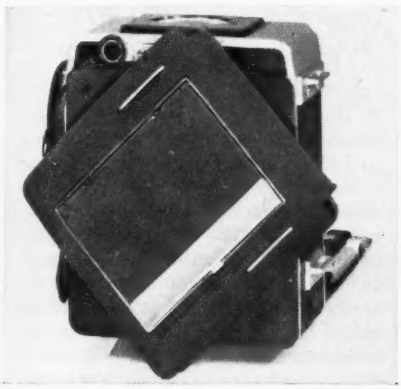
Electric shutter and flash tripping from button located conveniently to operate built-in BC circuit with self-contained batteries. With Graflite and Stroboflash accessories you trip electrically with either hand, at the camera or remotely.



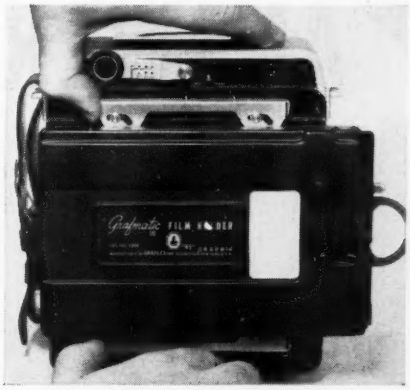
Interchangeable cams to match any lens operate integral rangefinder, focusing scale and flash exposure calculator. Cams are individually cut to match your lens characteristics. Slip in and out of position in a second.



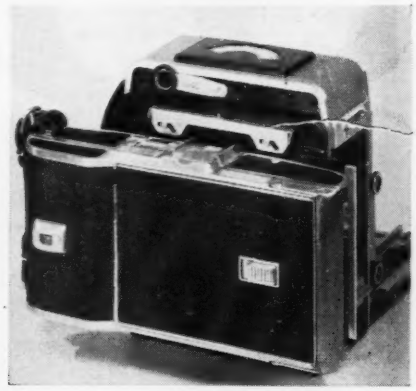
Automatic focusing scale is located conveniently on top of the camera. This one scale matches any lens you use on the camera. Combines with flash exposure calculator; just set dial for guide number, focus camera and read correct aperture setting indicated by pointer.



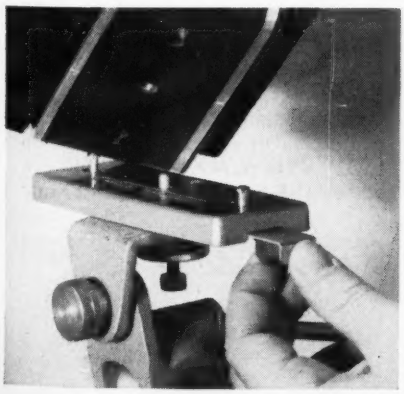
Revolving back for horizontal and vertical positions. Permits film holders to be inserted from top, bottom, right or left—a real convenience for many lefthanded photographers (also, hand strap and flash attach to either side of camera).



New style double cam action slide lock holds any accessory for Graphic or Graflok back. Slide off focusing panel and attach Grafmatic sheet film magazine, Roll Film Holder, Film Pack Adapter, Polaroid Back or Graflarger. Accessories become part of the revolving back.

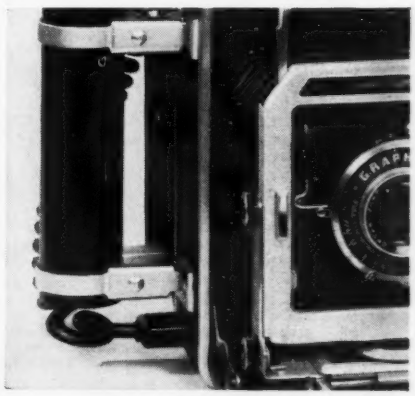


Use any type of film—black and white or color. Super Graphic accessories accept single sheets, film packs, 120 rolls and Polaroid (60-second) films. You can even use coated glass plates for scientific research requiring superfine grain or unusual light sensitivity.



Presslok Tripod Mount (accessory) fits any tripod and can be left permanently attached. Twin keyhole locks provide for instantaneous, fumble-free mounting of Super Graphic camera. Assures rigidity. Camera cannot be accidentally released.

Wide angle, normal and most telephoto lenses in shutter combinations suitable for a 4x5 camera can be mounted on a Super Graphic lensboard assembly. This assembly includes all internal connections for flash synchronization and electric shutter tripping. Lock lensboard in place and all connections are complete.



Three-prong, polarized flash connector cords plug into the camera body. There are no dangling wires on the lens standard which can obstruct the lens or rangefinder. The camera can be opened and closed without disconnecting the flash.

A Truly Great All-New Graphic for Prize-Winning Pictures

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. . . for more details circle 550, page 81

1 any Job

2 any Format

Wanted ONE VIEWCAMERA for . . .

3 any Lens

4 any Adjustment

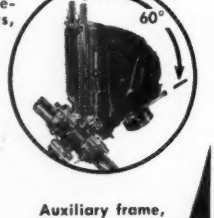
5 any special Application

6 any-Where!

The Ultra-Versatile SINAR has the ANSWER

INTERCHANGEABLE:
8 x 10"—5 x 7"—4 x 5"—2¼ x 3¼"
2¼ x 2¼"—18 x 24cm—13 x 18cm
9 x 12cm—6.5 x 9cm—6 x 6cm

Completely collapsible Wide-angle bellows, tilted 60°.



1. UNIQUE "CONSTRUCTION-UNIT" SYSTEM: The key to the SINAR is the SINAR STANDARD basic Viewcamera which can be supplemented or adapted to the specific requirements of any Job, at any Time.
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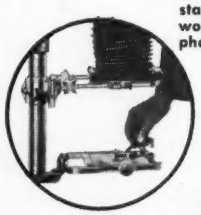
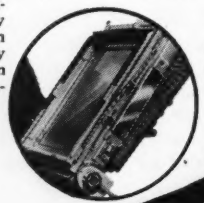
3. UNIQUE OPTICAL PERFORMANCE: The SINAR's completely collapsible bellows and its unlimited extension accommodate wide-angle and telephoto Lenses of any focal length.
4. UNIQUE VERSATILITY: Extreme 90° tilts, 3" left/right shifts, 30° side swings, unlimited rise and fall and swivel motion of entire SINAR camera around optical bench allow any desired Adjustment.
5. UNIQUE ACCESSORY DESIGN: ONE set of SINAR accessories, many with dual functions, permit Macrophotography, Copywork, Color separation, Photomicrography, Flash synchronization, Photomontage, 45° angle shots and any other special Application.
6. UNIQUE EASE OF HANDLING: The SINAR's sturdy, yet exceptionally lightweight, compact and completely collapsible precision construction assures convenient portability and instant set-up of SINAR in the studio and outside on location . . any-Where!

Auxiliary frame, used here as stage for Copywork and Macrophotography.



SINAR STANDARD, completely collapsed.



See your SINAR dealer or write for complete illustrated catalogue IPS-4

	SINAR STANDARD Basic Viewcamera	SINAR EXPERT Complete Outfit
4 x 5"	$349.00	$579.00
5 x 7"	$429.00	$679.00
8 x 10"	$649.00	$929.00

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. . . for more details circle 554, page 81

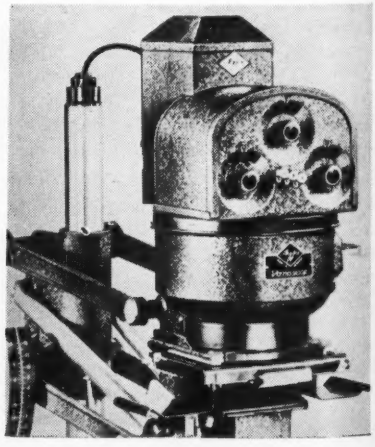
ducer said to be equally effective in all climates is now available from *Reeves Equipment Corp.* A product of Magna-Tech, model OMD 135 magnetic reproducer employs the double flywheel system with a heavy Mumetal shield covering head and sound drums. All vital parts are stainless steel and none of the moving parts require lubrication. Controls are located on one panel. Maximum film capacity is 5000′ of 35mm. Rewind time for a 2000′ reel is less than one minute.

Enlarger Colorhead 105

Agfa is introducing into the U. S. an enlarger colorhead for stepless color filtering for white light exposure by use of yellow, magenta and cyan. The density of each color is controlled by a dial so that color balance may be achieved simply and quickly by setting the three dials for the color balance desired. Color densities up to 100 may be obtained by turning dials; filters of 100 density may be added to produce a 200 density for each color. The colorhead is part of a new line of enlarger equipment for the Varioscop 60 now being introduced by Agfa. Other accessories include Variomat-C, an enlargement easel with an exposure control; Agfacolor-mat, an automatic color printer; a special carrier for miniature negatives; a book type negative carrier; a lens extension unit for use with the 105mm projection lens; and a wooden storage box for projection lenses and other accessories.

Mass-Production Printer 106

The Metro model mass-production printer from *Advance Photo Equipment* turns out up to 1,000 prints per hour. It can be used for projection or contact roll stock up to 11" wide paper. Paper pull can be set at 6-8-10-12-14 inches or any



Enlarger Colorhead See 105

intermediate length. A predetermined counter stops advance when the full count is reached. As a special feature a constant flow of air helps keep negatives free of dust.

Kodak Retina 111C **107**

Optical advances in the viewfinder and rangefinder are incorporated in the new *Kodak* Retina 111C. The extra-size rangefinder shows at all times the fields covered by the standard (50mm), wide-angle (35mm) and telephoto (80mm). Each frame has parallax indicators for fields covered at the minimum focusing distances. The finder also provides a larger and brighter viewing image than earlier models. Standard Retina features—single stroke film advance, *f*/2 Xenon C lens and built-in exposure meter—are retained. Price: $175.

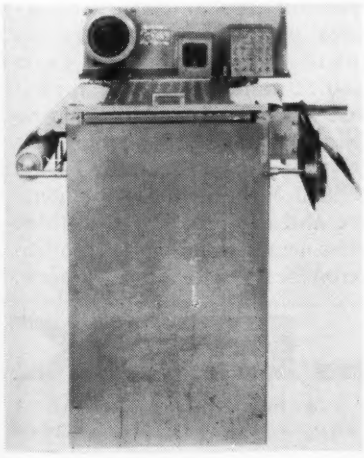
Microfilm Reader **108**

Ambidextrous controls are available on the new "Medalist" 16mm film reader from *Recordak Corp.* It is said to be the first time the film winding wheel may be placed on either side of the viewing screen. Operating controls—scanning lever for centering film images; orientation wheel for turning film images upright; focusing knob; and lead spindles—are placed immediately in front of the screen. A new feature is a self-loading, gate-like aperture. The "Medalist" may be adapted to make paper facsimile prints in conjunction with a Rapid Facsimile Kit.

Kenro Accessory **109**

A prismatic head, interchangeable with the standard head on the Kenro "Vertical 18" Camera, permits office and duplicating depart-

continued on page 64

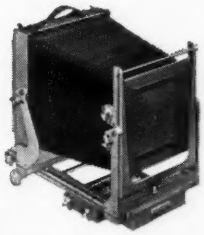


Mass Photo Printer See 106

You get top quality, durability, advanced design with

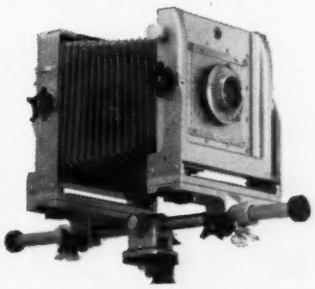
calumet view cameras, photographic processing equipment, studio equipment, laboratory equipment

CALUMET 8x10 VIEW CAMERA



Rigid, all-metal, with swings, slides, 6 x 6 lens board. Compact when folded. For studio, on location.

CALUMET 4x5 VIEW CAMERA



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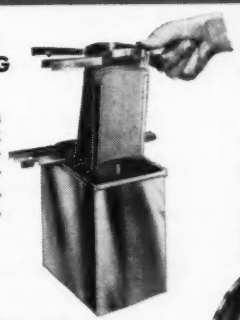
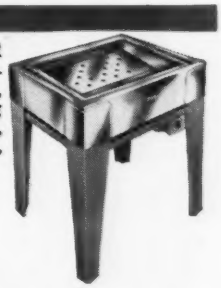
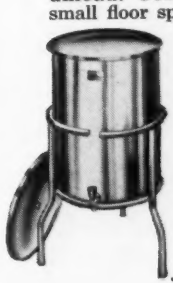


PRINT WASHER

Automatically controls water flow, timing, washing action. Easy to load, unload. Compact, small floor space.





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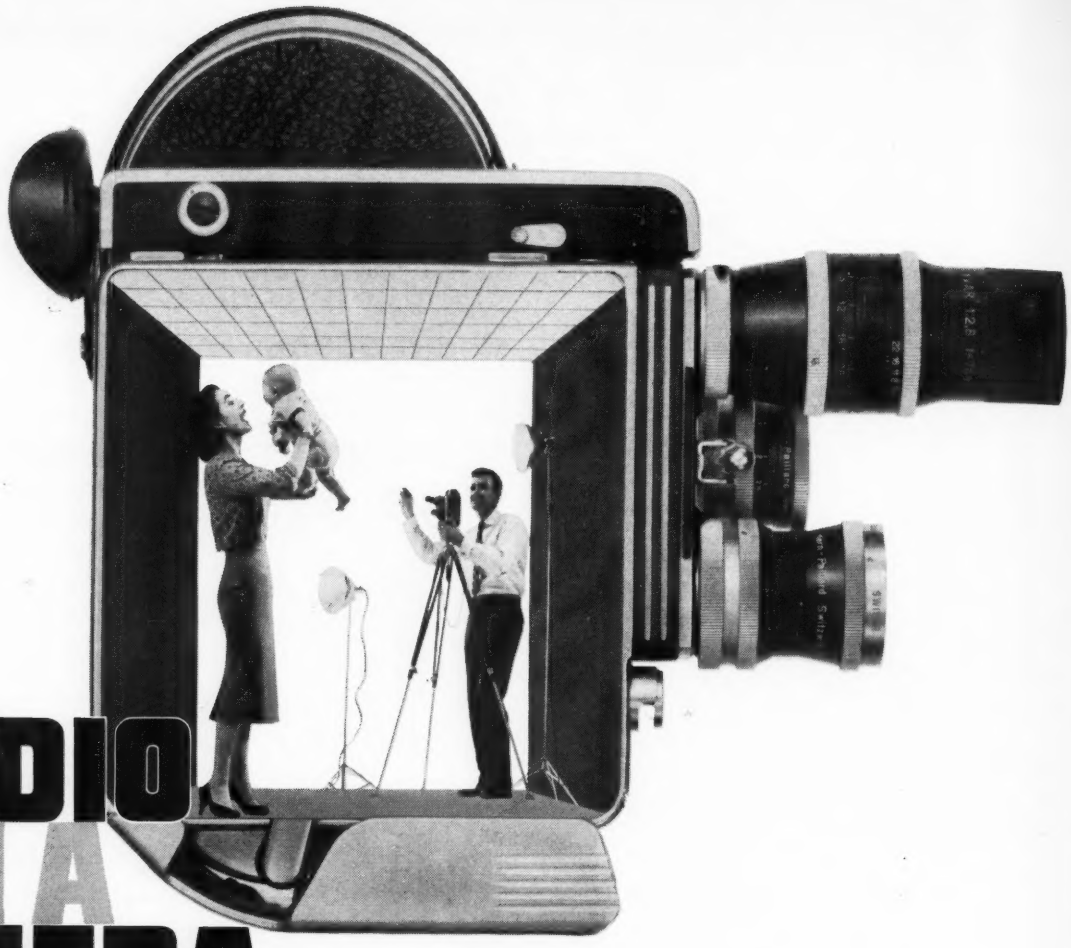

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Industrial Photography

VOL. 7, NO. 4 APRIL, 1958

PHOTOGRAPHY AS A BASIC TOOL

I spent several days in the Midwest this month and met, for the first time, one of the real veterans of the industrial photographic field. One of the questions I put to him was, "What do you think will happen to industrial photography if we are in for a prolonged business recession?"

By way of answer, he pointed out that the field has changed considerably in his time. In the early days, photo departments were considered a luxury—nice, but not essential. As a result, there was a kind of photographic boom and bust: departments expanded during good times and contracted sharply during business slumps.

Today's progressive photo department, however, is deeply integrated into the business organization and has become an almost indispensable arm of the engineering, administration, production and sales divisions. It cannot be considered just surplus fat to be trimmed.

This brought us around to the "picture taking" part of the department's duties. He commented that while this was the fun part of the job, and esthetically most rewarding, it was far from being most important in management's eyes. Too much emphasis on photo-journalism and public relations does an injustice to the full potential of our profession. In periods when costs are more closely scrutinized, he noted, the fate of a photo department may well depend on how much it is contributing to *every* basic industrial function.

Jim Watkins

Publisher

COVER PHOTO

This month's cover photo was originally used as the cover shot for a catalog put out by The Haloid Co. Photographer Robert C. Chick used a 5x7 Burke & James View Camera fitted with an Eastman Ektar Lens stopped down to *f*/32. A #50 flash bulb inside the lithographers viewing box was fired from an extension cord with an open-closed shutter speed. The Tri-X negative was developed in DK-60 at 68° for five minutes.

PHOTO CREDITS

Pages 18 and 19, Tractor Group, Allis-Chalmers Manufacturing Co.; Pages 20 and 21, Sylvester Hight, David L. Miller; Pages 22 and 23, Photographic Department, The Haloid Co.; Page 24, Public Relations Department, E. I. du Pont de Nemours & Co.; Page 27, North American Aviation, Inc., Columbus Division; Pages 31, 32 and 33, Photographic Department, Bell Aircraft Corp., Photographic Department, Ford Motor Co., David L. Miller, Hubbard W. Ballou, Recordak Corp.; Pages 34 and 35, Hal Campbell Studio, Okenica Studio, George Miles Ryan Studios, Photographic Department, The Haloid Co., Filmsort Co., Ozalid Division of General Aniline & Film Corp.; Pages 36 and 37, The Library of Congress; Pages 38 and 39, Atlantic Microfilm Corp.; Page 41, Hubbard W. Ballou.

ALLIS-CHALMERS FILM PROGRAM REACHES

audience of 7,000,000

Dual sales promotion-public relations effort gets at sales prospects via TV and local community day gatherings.

by JAMES HUGHES
Associate Editor

Last year approximately seven million persons watched motion pictures produced by the Allis-Chalmers Manufacturing Company Tractor Group; five million people saw them on television sets and two million at group screenings.

One of the major reasons for the company's growing television audience (it was four million in 1954) is that all its major productions are in color. Stations as they acquire color equipment rerun Allis - Chalmers pictures which they had previously shown in black-and-white, as well as the company's new releases.

But from a dollars-and-cents standpoint the most important segment of the company's overall audience is composed of the relatively small groups (when compared to TV audiences) which see its films at Community Day gatherings staged as a major part of the Allis-Chalmers sales promotion effort. This segment contains the highest percentage of potential customers. On a Community Day, from 75 to 1000 residents in an Allis-Chalmers dealer's area gather in the local theater, farm equipment dealership or any available meeting hall for refreshments, entertainment and information about Allis-Chalmers equipment.

TWO TYPES OF FILMS

They see pure-sell pictures like "Designed for Progress," which displays and explains the new Forty-Five Motor Grader, and pure entertainment pictures like "Evangeline Land," which describes the life of the Acadian people in Louisiana's bayous. They see pictures which fall in between these two extremes; service films which have indirect sales value, such as "Taking the Pasture to the Cows." This production outlines a new system for direct feeding of cattle through harvesting of forage. It illustrates how cattle raisers across the country are making the new feeding system pay off. Increasing the practice of forage harvesting, as "Taking the Pasture to the Cows" was designed to do, naturally enhances the potential of forage harvester machine sales.

These films are made by the Tractor Group's own five-man unit with the considerable help of an outside lab, Chicago Film Studios, Inc., and the occasional help of free-lance cine-photographers. The latter are called upon only when it is less expensive to hire them for small assignments in their bailiwicks than to transport the unit's own crew and equipment.

The movie unit is under the

direction of R. L. Smith, the Tractor Group's Manager of Advertising, and R. S. Piasecki, Supervisor of Photography. It is geared to produce six movies a year, four product presentations and two institutional movies.

The bread-and-butter sales films, although perhaps less spectacular when completed than the institutional productions, exemplify best the steps followed by Allis-Chalmers in bringing a picture to the screen. More company elements participate in these films than in other kinds.

Such movies originate with discussions by the movie people with product sales managers about forthcoming developments. Together they work out the tenor of the sales message and determine whether the movie will be an application movie or a nuts-and-bolts description of a new product. During production, sales people act as technical advisors, checking the accuracy of the picture's sales message.

The groundwork laid, the production goes before the cameras. The Tractor Group shoots approximately 51,000 feet of film a year, roughly a tenth of which goes directly into movies in production.

EQUIPMENT USED

The cameramen use as front-line equipment five Cine-Kodak Special II cameras equipped with 25mm f/1.4 Ektar lenses and 15mm Ektar wide-angle adapters. The wide-angle lenses are particularly useful when shooting from the tops of vehicles in open fields. The cameras are mounted on tripods and a sixth tripod, with built-in level, is available for particularly exacting applications.

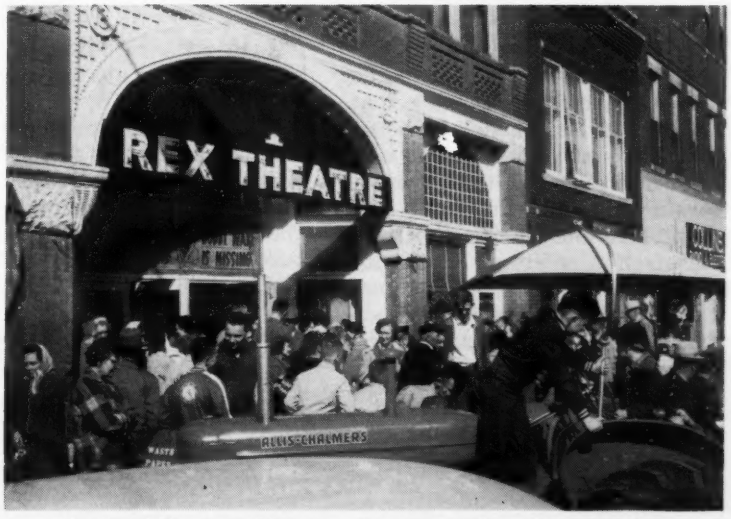
Although there is no hard-and-fast rule on shooting time, once the footage has been shot, production usually is completed within six weeks. All picture editing and preliminary cutting-room work is done in Allis-Chalmers' own offices. Work-printing, sound recording and other production are handled by Chicago Film Studios.

Prints of the sales films are

continued on page 28

Allis-Chalmers movie cameramen on location for films to be shown . . .

. . . at Community Day gatherings in local dealer warehouses . . .

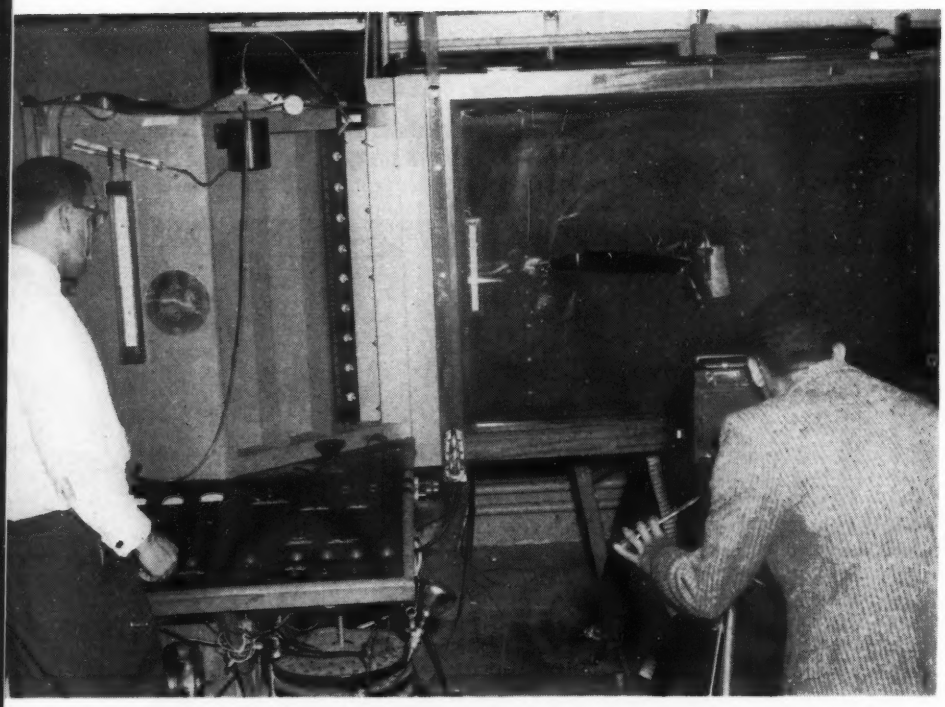


. . . or the local theater which may be commandeered for the day.

SYLVESTER HIGHT
James Forrestal Research Center

Wind-tunnel photography aids aircraft design

In Princeton wind-tunnel studies, the flow of air over a wing is made visible to the camera by filaments of smoke.



Sylvester Hight prepares to photograph flow of smoke over cross-section of wing. Rudy Lehnert (left) regulates position of the wing from console.

As flying speeds have increased, minimum safe landing speeds have also risen so that setting an airplane down on existing short runways or carrier decks exerts a dangerous strain on both the pilot and plane. At the James Forrestal Research Center at Princeton University, experiments designed to reduce landing speed by modifying wing construction, have been aided by wind-tunnel photographs in which the flow of air over the wing is made visible.

In flight, pilots change the wing's angle of attack in order to slow the plane and make its minimum flying speed slow enough for a safe landing. However, extreme angles of attack cause the flow of air to separate from the top surface of the wing, and the aircraft stalls. To crack this stalling, or low-speed "barrier," it was necessary to get a pictorial record of the airflow around the wing as it was changed in angle of attack.

FILAMENTS OF SMOKE

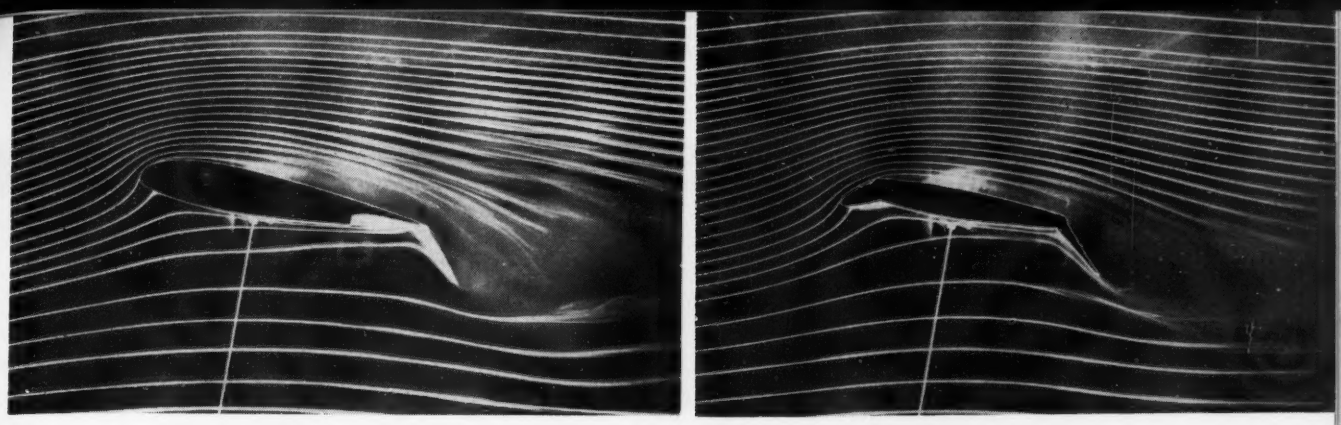
In the 12-foot wind-tunnel at Princeton, the streamlines of air flow are represented by filaments of smoke, made from heated kerosene, which are drawn over a cross-section of a wing mounted on a black wall in the four-inch wide center section. The other wall of this center section is a 3x4 foot plate glass window.

Inside the tunnel a series of 18 pre-focused 750R lamps—nine above and nine below — illuminate this middle section so that a 4x5 Speed Graphic mounted on a tripod a few feet from the window can photograph the white smoke as it passes in front of the black background.

Speed of the smoke was kept at around 25 mph as the patterns of flow are the same no matter what the air speed. The wing section is on a movable turntable, controlled from a console, so that its angle of attack can be changed during the tests.

Speed at which an airplane must travel to maintain lift depends on the plane's weight, its wing area and the angle of attack. In modern jet aircraft, these three factors are such as to increase the minimum speed needed to avoid stalling. The wing area must be cut to a minimum to reduce drag for high-speed and, to avoid creating shock waves at high speed, the wings must be extremely thin, which limits the lifting force at a given angle of attack.

Two series of smoke tunnel studies—of a thick, blunt-nosed wing and a thin, sharp-nosed one —demonstrate this last point. With either wing in the horizontal position, the air stream flows smoothly around the whole wing. As the angle of attack is increased by tilting, the flow begins to become turbulent and separate from the wing surface, indicated by smudged filaments and blank space above the wing. With increasing angle the point



Examples of smoke-tunnel photographs made at Princeton University's James Forrestal Research Center. They show what happens to the flow of air over an airplane wing under various controlled test conditions.

of separation moves farther forward until no flow adheres to the top of the wing, which is then stalled. Comparing the photo records of each study revealed that the thin, jet-type wing stalled at a much lesser angle of attack.

The turbulence which causes stalling is explained in the concept of the boundary layer—the envelope of air surrounding a wing during flight. Briefly, it involves friction between the sublayers of air, in the envelope, which move at different speeds. This friction is minimized when the pressure on the wing is reduced by acceleration of the air stream over the wing. When the air flow begins to decelerate, as it does when it reaches the downslope of the wing curve toward the trailing edge, pressure on the wing increases, frictional loss of energy in the boundary layer becomes more severe and the air flow becomes turbulent and separates from the wing. Thus the wing loses lift, or stalls.

If the boundary layer can be controlled to prevent turbulence and separation, the wing's lifting power will be enhanced and the plane's minimum flying speed can be reduced. This can be done by injecting more energy into the boundary layer to replace frictional losses.

One way to do this is to blow high-energy air into the boundary layer, either by placing a slot at the wing's leading edge to scoop in air from the airstream or by pumping jets of air into the layer from within the wing itself.

Another method is to suck the low-energy air immediately next to the wing surface into the wing through holes or slots in its surface, thus drawing high-energy air from the air stream into the layer. Also, by adding various kinds of flaps to the trailing edge, the circulation of air around the wing can be regulated.

EFFECTIVE CHECK

The Princeton experiments, operated under contract with the Office of Naval Research, provide an effective visual check of the behavior of air streamlines around the wing. The photographic flow visualization technique developed at the center by the author, offers a graphic representation of what happens as the wing is changed in angle of attack.

The essence of the photographic studies is to compare the streamlines around the same wing, at different angles of attack, or with one of its flaps in various positions. To measure the streamlines and get a more direct comparison, the before-and-after technique was abandoned in favor of one double exposure. But to distinguish the "before" lines from the "after," two separate colors were needed.

After considering and rejecting colored smokes, I photographed white smoke using Ektochrome, Type B, and two filters —a red (No. 25) and a green (No. 58). The film was processed normally but the first developing time was increased to 15 minutes. Resulting photos were clear, but where the red and green lines crossed they appeared yellow, thereby confusing the general effect.

However, this method was otherwise impractical because of the film's slow speed (the camera had to be set at *f*/4.7 at 1/25th of a second), lack of proper light, the time and expense involved in processing, etc. In addition, a method was needed to facilitate reproduction of the photos for reports.

The new system involved Dye Transfer techniques, and it was faster, cheaper and provided prints suitable for reproduction.

I solved the film speed and lighting problems by reverting to black and white films. By processing my own negatives in the Lab's darkroom, and because of the easier handling possible

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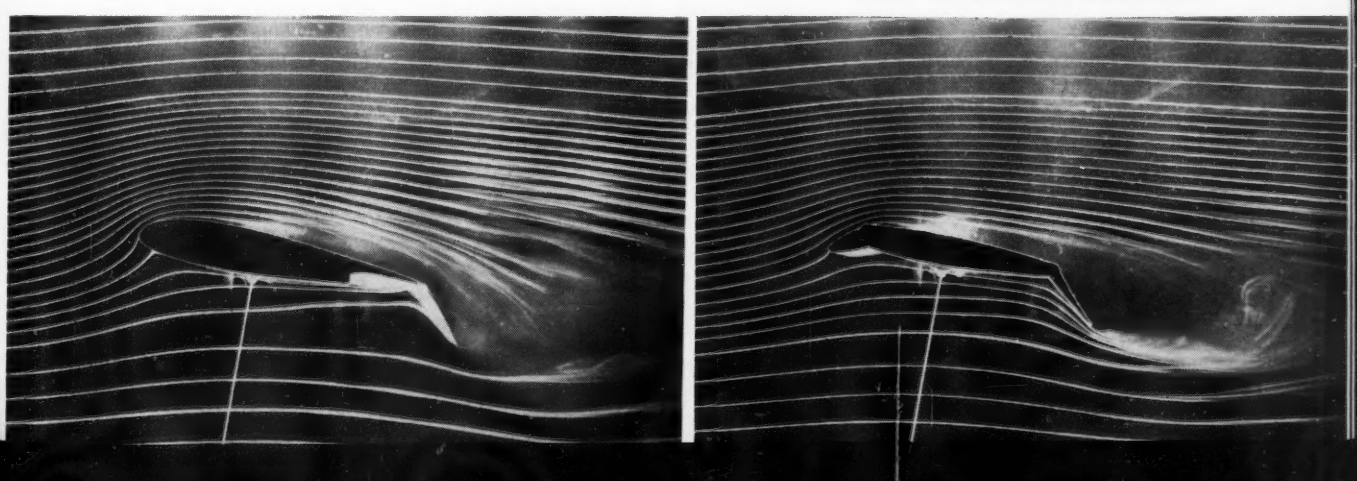
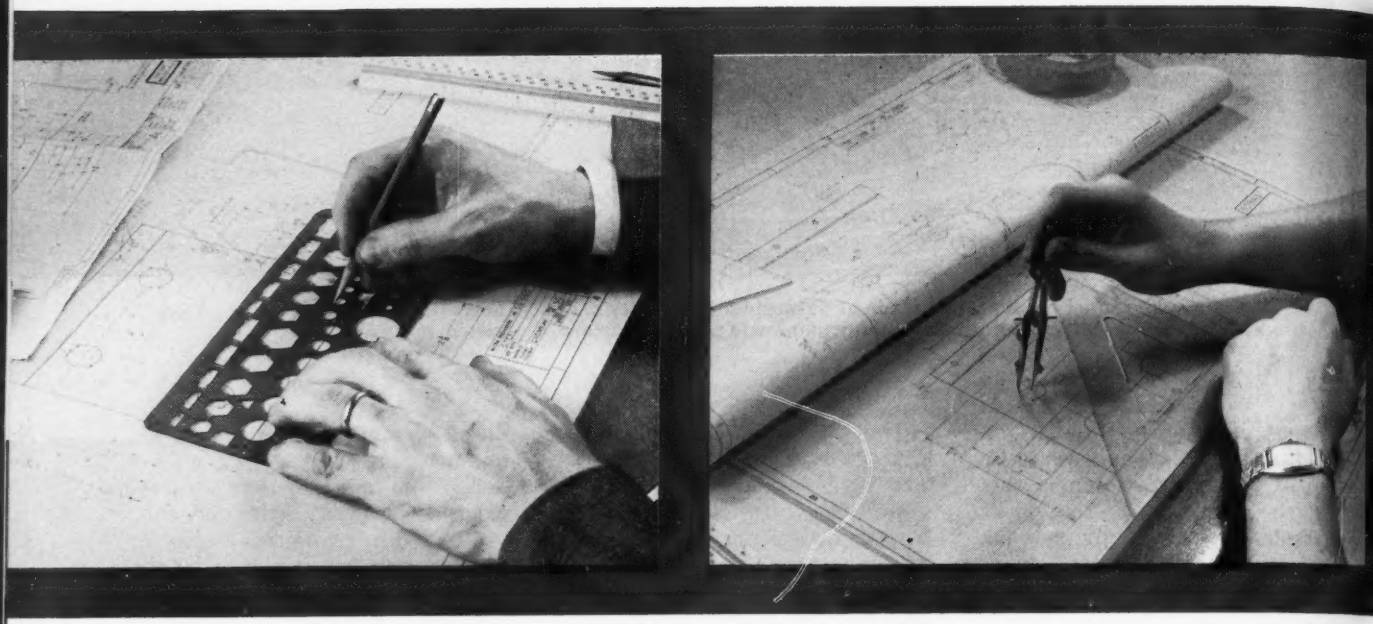




Xerographic method of making design changes begins with engineers marking up a direct-reading, reverse-run sepia intermediate (left). Original is now altered (right) with the marked-up intermediate as a reference.

Visual engineering changes through xerography

by E. C. CARLSON
IBM Product Development Lab.

Xerography is lending a hand in one of the critical areas in the production of today's complicated products — the processing of engineering changes at the plant.

Whenever a machine or one of its components is improved, the new design information must be distributed to many areas. The speed of this distribution is important, since changes in design influence field performance, customer reaction and sales. By using xerographic techniques we not only facilitate processing of the design changes, but cut down on possible errors.

PREVIOUS CHANGE METHOD

Prior to adopting the xerographic method here at IBM, we processed engineering drawing changes in the following way: first, the engineer indicated the change with an opaque pencil on a right reading sepia intermediate, and the draftsman revised the original drawing. Then the engineering change writer wrote a "Remove and Add" notice. Next, a typist transcribed change information to offset paper masters, introducing the possibility of human error and necessity of proofreading. Finally, duplicate copies of the written notice, along with prints of the revised original drawing were distributed.

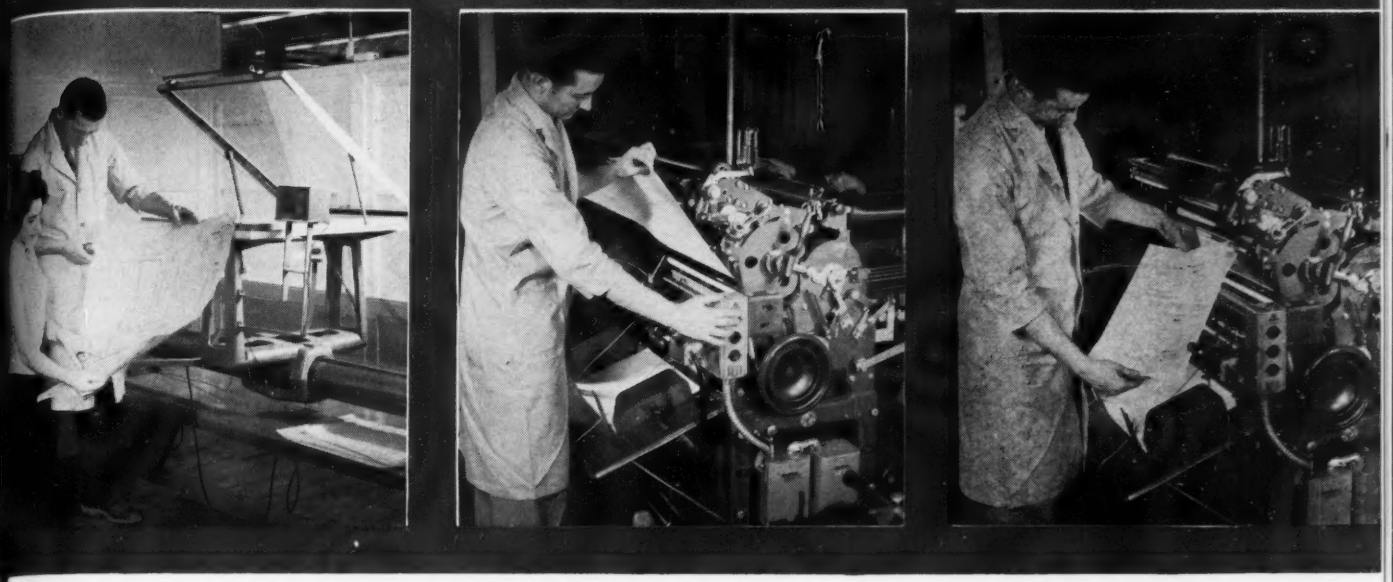
This system provided a complete history of changes to a part, *but* the procedure was lengthy and subject to errors at every stage of preparation. Also, the new print had to be compared to the old one while the "Remove and Add" notice was being read.

Under the new system, the xerographic "Visual Engineering Change Notice" eliminates errors made in the interpretation of the change by the change writer and in copying by the typist. It also provides a complete history of changes on a single sheet of paper.

STEP-BY-STEP

The new system, inaugurated by R. M. Cundy, begins with the engineer indicating additions with a dark orange or red pencil on the back of a reverse reading sepia intermediate.

Deletions are indicated by drawing a series of spaced lines with a hard pencil. The original drawing is now altered by referring to the marked up intermediate. The marked intermediate and revised original are then xerographically transferred to paper offset plates. The last step



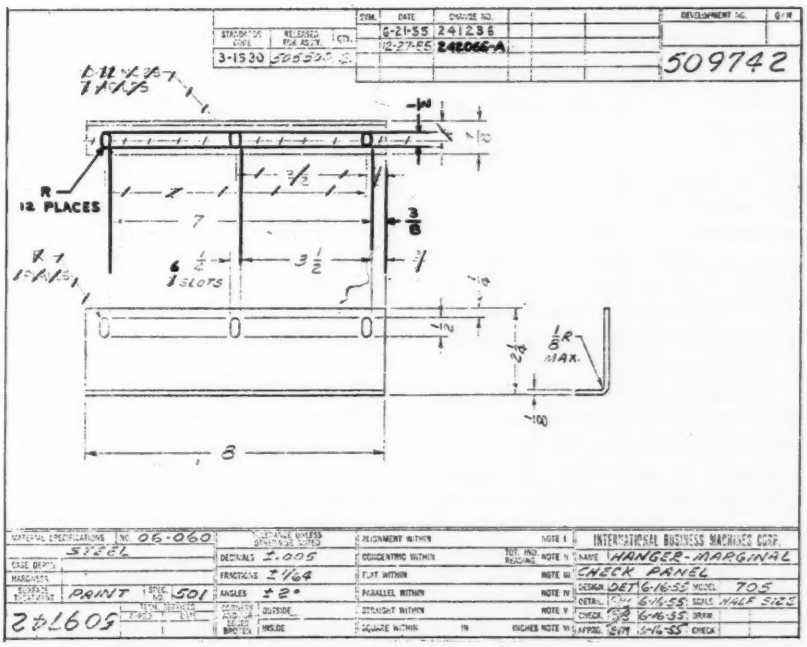
(Left) Marked-up intermediate goes directly to Xerox Model 1218 camera for copying. (Center) Operator mounts fused master on Multilith 2066 duplicator, and (right) inspects sample runoff copies. Usual run is short.

By showing both changed and unchanged portions of a drawing, IBM's new visual notice provides a complete history of engineering alterations on a single sheet of paper.

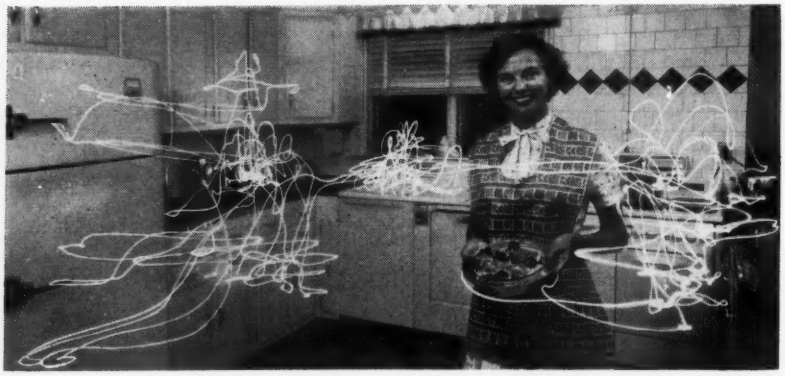
is the offset printing and final distribution of duplicated copies of both the intermediate and revised original.

The duplicated intermediate becomes a "visual notice" of the design changes made. Since it is prepared by the procedure outlined above, the additions made with an orange or hard pencil appear as bold black, and the unchanged portions as a "ghost" or gray image. This single copy showing the changed and unchanged portions of the drawing replaces the separate "Remove and Add" notice used in the former change system and in many cases can be used for immediate rework of parts.

By use of this "Visual Engineering Change" system, we have been able to increase our change output and make distribution in half the former time. □



A typical IBM "Visual Engineering Change Notice." Additions appear as bold black and the unchanged portions appear as a "ghost" or gray image.



Streaks caused by tracer lights show many movements involved in preparing home-cooked goulash.

Preparing pre-cooked goulash takes far less effort as this motion-analysis photograph shows.

by MITCHELL BADLER
Associate Editor

Tracer lights and time exposures show motion savings made possible for housewives by pre-cooked foods.

Photo demonstration clinches the argument

To prove that new food packaging developments are a major time and labor saver in the kitchen, E. I. du Pont de Nemours & Co. recently sponsored a series of experiments in photographic motion analysis. By using tracer lights and time exposures, contrasting motion records were made of a housewife's movements as she prepared a pre-cooked pre-packaged dinner and a dinner fixed entirely in the kitchen.

Photographer Alex Henderson first set up a 4x5 camera and posed his subject in a central position to show up all major kitchen appliances. He lit the scene with flood lights and exposed six films. Three showed the subject holding a bowl of pre-packed goulash ready for the table; three showed her in the same position with a bowl of conventionally - cooked goulash (wearing a different apron).

With the room completely darkened, the six exposed films were re-exposed to show the motions required in cooking as traced by the small lights attached to the housewife's wrists. Necessary motions had been previously analyzed by actually preparing the two meals. In the photographic run, she merely repeated them—i.e. she went to the refrigerator but did not actually remove the food, etc.

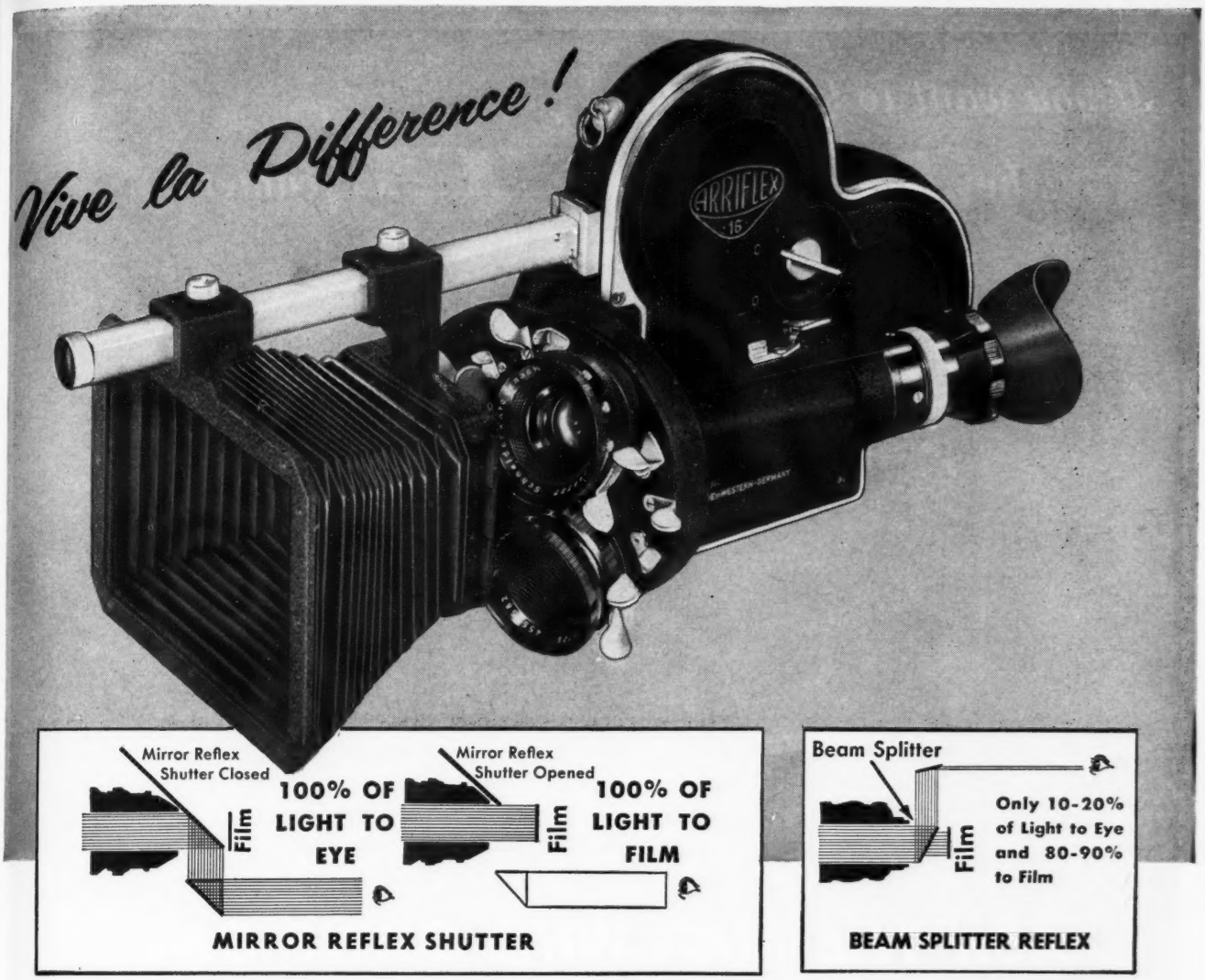
NO STATIC TIME

Three times the housewife went through the complex-multi-movement preparation of conventional goulash. In each case, she followed the motion analysis but eliminated all static time, *i.e.*, time in which the cooking procedures kept her relatively inactive or in one place. Had this static time been retained, the lights would have fogged the film at these points. Similarly, the three remaining films were exposed to show the fewer movements required in preparing the pre-packaged food.

Care was taken to keep the wrist lights turned toward the camera at all times, unobscured by the subject. For example, at the sink, washing and cutting motions were made facing the camera.

Elapsed time for the time exposures ranged from 45 seconds for the pre-packaged illustrations to about 90 seconds in tracing the motions needed in conventional cooking. On each of the six exposures, the shutter was closed when the housewife returned to the position at which the original full-light exposures were made.

The end results were a dramatic, graphic demonstration of the motion savings made possible for housewives by today's packaging wraps. □



The great advantages of a reflex viewing system in a movie camera are obvious:

No parallax, no finders to match, no rackover inconvenience but continuous focusing and viewing through the taking lens.

There are two ways in which reflex viewing can be accomplished:

1. By means of a *mirror reflex shutter* which rotates at 45° between lens and film plane.

   The great advantage of this system is the fact that 100% of the light goes to the film and the eye intermittantly. When the shutter is open there is no interference between film and lens. When the shutter is closed, its mirror surface reflects all of the light to the eye. Result: Easy focusing and viewing on a bright crisp ground glass image even in dim light, or when the lens is stopped down.

   The Arriflex—designed for the professional—uses the mirror reflex shutter, which of course is a much more costly design.

2. By means of a *beam splitting mirror or prism* which is mounted between lens and film. This reflects some of the light (about 20%) to the eye and transmits the balance to the film.

   The disadvantages of this system are:

   The light reflected to the eye is so weak that it is difficult to focus or even sight, unless the lens is wide open and the scene brightly illuminated. In dim light, or if the lens is stopped down, the finder image is so weak it is practically useless. But the light going to the finder is taken away from the film, requiring the f stops of the taking lens to be specially adjusted. The beam splitter permanently in the light path, and close to the film plane, frequently accumulates dust and other foreign matter which may ruin the picture.

Don't take our word for it! Try it yourself. Take an Arriflex 16 and a "beam splitter reflex" and look at the same scene, through similar focal length lenses, at various f stops from wide open to f22. You will exclaim with us: Vive la difference!

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J. J. B., Bellevue, Ky. . . ."It's the one camera that does what my previous two did."

M. G. J., Washington, D. C. . . ."I do medical photography and checked all cameras for use in eye operation photography and this is the best . . ."

M. L. R., Dalton, Ga. . . ."This is my second Exakta. The first, is still going strong after five years of hard usage. I cannot praise the Exakta too highly."

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J. C. K., West Chester, Pa. ". . . the best type of 35mm."

F. W., Piermont, N. Y. ". . . far and away the best for the price."

E. H. A., El Monte, Calif. . . ."Compared all the best cameras on the market, then bought an Exakta."

H. E. D., Brooklyn, N. Y. . . ."I can't find anything better for all around work."

L. E. S., Tacoma, Wash. . . ."This is the second Exakta I have bought this year."

A. J. S., Seattle, Wash. . . ."Wonderful for versatility and performance."

A. B. R. Macomb, Ill. . . ."I have used it for the past two or three years and I think it is one of the best ever. I would not trade it for any other camera that I have ever handled."

R. J. S., Duarte, Calif. . . ."the camera with the most."

Dr. G. R. T., Ft. Thomas, Kentucky . . ."We are using your Exakta camera in our Pathology laboratory and are very well pleased with it."

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R. A. S., Pleasanton, Calif. . . ."I am using an Exakta equipped with both viewfinders . . . I found this combination hard to beat."

V. R., Berkeley, Michigan . . ."I have been an Exakta owner for many years and my friends and I think there is no finer camera."

D. B. R., Moorestown, N. J. . . ."the Exakta is a wonderful versatile camera—and I consider myself most fortunate to own one."

K. K. R., San Diego, Calif. . . ."as a teacher in color photography the advantages of the Exakta over any other camera have convinced many students their work can be improved by using an Exakta. The Exakta is the most versatile 35mm camera made."

L. E. S., Tacoma, Wash. . . ."I think it is the best camera on the market."

J. E. C., Westwood, N. J. . . ."I own two Exaktas . . . both are wonderful. The Exakta does everything that a camera can do . . . I use it for telephotography . . . I use it for scientific work . . . also photomicrophotography. I use it with electronic flash."

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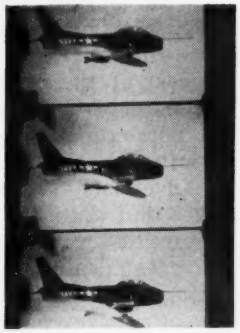
. . . for more details circle 536, page 81

Consecutive frames from film shot by pilot in chase plane show empty fuel tank being dropped from plane under test.



Test pilot Richard Wenzell is fitted with a helmet chase camera by instrumentation engineer Don White.

Frames of tuft pattern taken with helmet chase camera using 63mm telephoto lens. Camera speed: 64 frames per second.

A two-camera helmet

Test pilots have their hands full so those at North American Aviation use their heads to take pictures.

by MITCHELL M. BADLER
Associate Editor

Flight test engineers at the Columbus Division of North American Aviation, Inc., need no longer rely on a test pilot's eye witness reports for data. Instead a matched pair of modified aircraft gun cameras mounted on the pilot's helmet is used to make a complete cinematographic record of the test.

So that the pilot can record as much data as required, a sequence switch is provided to permit switching from the right to the left camera as each unit's 50-foot reel of 16mm film is exhausted. In addition, feed and realignment of new film cartridges can be accomplished by means of touch, using two posts located over the right ear position. Time limits per reel are one, two or four minutes per reload, depending on the frame speed (64, 32 or 16 fps.) to be used. Camera motors are electrically driven by the aircraft battery system.

The helmet chase camera has been used to record tank and stores separation from FJ-3 and FJ-4 Fury jet fighters produced at the Columbus Division. It is also useful for recording tuft studies showing air flow patterns; aircraft action in spin tests, high-speed pullups and power application and dive brake effects. It was used once to record damage encountered by an airplane in flight, for study in the event an emergency landing proved unsuccessful. (It didn't).

Special modifications of the shutters permit a speed of one five hundredths of a second, or faster. From film so exposed, it is possible to print stills of sufficient quality for research use. This speed also makes it possible for the pilot, except in attitudes of high "G" loading, to photograph his own test instrumentation. "G" forces above four times gravity tend to make the unit unwieldy. A quick disconnect feature permits the pilot to abandon the whole installation in less than two seconds if an emergency develops.

A sighting mechanism and lens, with 49 adjustable positions, lowers itself into position when the pilot brings down his glare shield. Concentric rings guide his right eye to the photo area. With two units, on two pilots, either may engage in test work, while the other serves as chase airplane, making photos. Three of the sets are currently in use by North American. □

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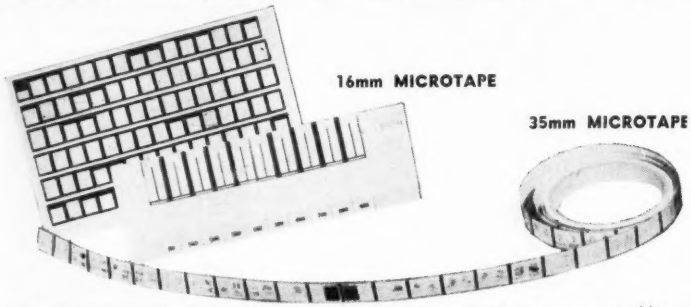

Typical MICROTAPE Record Cards. A 3 x 5 card can hold 40 pages of 8½" x 11" material in MICROTAPE form—and a great deal more per card if larger cards are used.

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. . . for more details circle 575, page 81

ALLIS-CHALMERS

continued from page 19

distributed to the company's 35 branches, which make them available to Allis - Chalmers dealers.

Product films are estimated to have an average life of two years, reaching the end of their usefulness when a basic product design is changed. On the other hand, many of the institutional films are long-run affairs, "Evangeline Land" having been in distribution for nine years.

The total cost of the Tractor Group's motion-picture program amounts to approximately one-twentieth of its gross advertising budget. Advertising Manager Smith believes that in return for this expenditure "the program is delivering a great deal of value in long-lasting public relations tools and direct sales promotion." □

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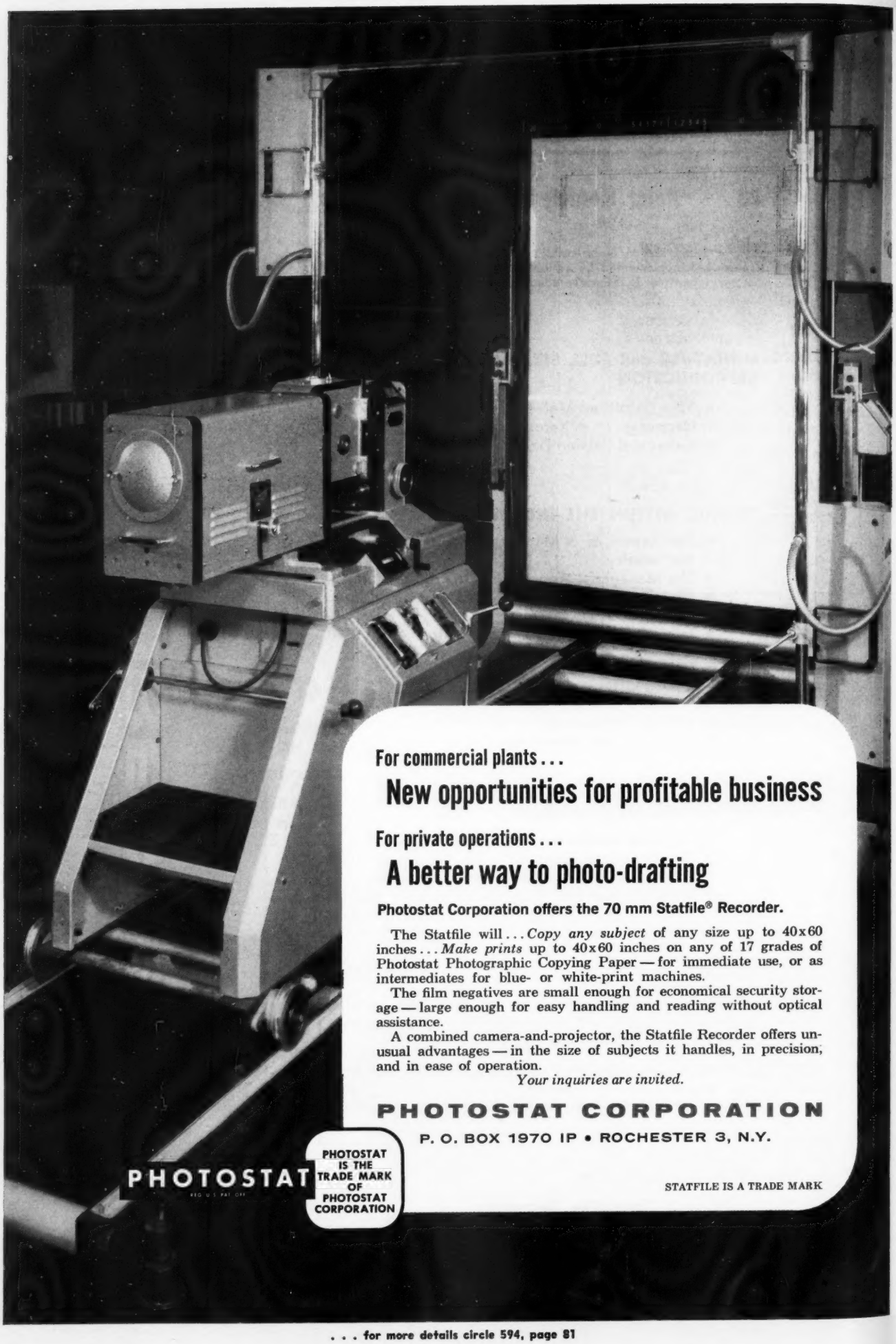
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Selection of a microrecording program

Wondering what form of microtext best suits your needs? Look for the answer in this extract from "Microrecording,"* a definitive work which has been adjudged a classic in its field.

by CHESTER M. LEWIS & WM. H. OFFENHAUSER, JR.

Although cost is usually the impelling factor in selecting a particular form of microtext for a microrecording program, there are instances when cost is not the primary consideration because of the end-use of the microtext. The pressing questions are "What will it do?" and "What will it cost?"

A study must be made to determine the accessibility, storage, use, and filing costs of originals versus facsimiles in microrecord form; the retention and deterioration of the originals in storage; the point at which it is cheaper to microrecord than to retain the originals; and whether in the final analysis it is more satisfactory to retain the original record than to utilize its content in the form of microtext.

After these factors have been determined, selection may depend on whether multiple or single copies of the original are desired. If only a single copy, some form of microfilm is indicated. If multiple copies are desired, then the number required may dictate whether microfilm, Readex Microprint, Microcards, or Microlex should be the chosen medium.

In general, but not necessarily in the given order, a user or purchaser of a microrecording program would prefer:

1. Microtext that can be read easily for prolonged periods if necessary.
2. Microtext that is self-indexing (thus eliminating extensive search).
3. Microtext that consumes the smallest amount of storage space and may be stored in existing equipment or require a minimum amount of new equipment.
4. Microtext with archival properties of such nature that the manner of storage creates a minimum problem.
5. Low-cost readers or viewing apparatus that accommodates all or most types of microtext and gives excellent projection, without damage to the microrecord.

16MM MICROFILM

Documents that are approximately 8½ x 11 inches, or not more than 16 inches in width, such as letters, books, bank checks, are usually recorded on 16mm microfilm. Diebold, Inc., has made a management study of record retention costs based on records that can be recorded

Many small companies often use a centrally located microfilm reader, like the Model C. Recordak Film Reader below, for all reference work.

Copyright 1956 by Interscience Publishers, Inc., 250 Fifth Avenue, New York; 468 pp.; $8.50.

At Bell Aircraft as frame from roll of negative microfilm is projected, typist enters catalog information on file envelope.

on 16mm film. The study compares the estimated costs of physically storing records and of microfilming records.

Although the Diebold study cannot apply precisely to every 16mm application, it does provide a good starting point. The charts indicate the break-even point at which either files or microfilm are equivalent from a cost standpoint. It is feasible to insert your own figures in the formula outlined.

It is customary for microfilming cameras to record identification data of the document being photographed at the same time; such data include the document number, the date, etc. Where large numbers of items of a single size are handled such as bank checks, for example, automatic feeding mechanisms are customary which require an operator to do little more than keep the hopper filled.

Such machines often combine other operations; check microfilming machines, for example, often are designed to indorse the checks they photograph. After all operations are completed upon a check such machines stack the finished documents neatly in another hopper from which they may be removed. Generally speaking, machines that perform multiple operations are quite costly; their purchase can only be justified when the number of documents to be handled each day is quite large. Costs for 16mm microfilm used in card or jacket form will vary according to the application. A typical example is that of a newspaper using 16mm microfilm in Filmsort jackets at a 1:17 reduction ratio for its collection of clippings. The preparation, photographing, and insertion of the film is undertaken by the service company. Using jackets 6 by 3½ inches, approximately 50 to 90 clippings, depending on their size, can be inserted in microfilm form.

In this form 1750 clippings per inch can be filed in 25 jackets as compared to an average of 80 clippings per filing inch in their original form. This is based on an 8-inch length to the average clip. The microfilm cost per clip is approximately 1½ cents. The cost per each completed card, which holds 16mm strips, date, and classification, is 55 cents. This includes the cost of the jacket card, which is about 9 cents. Jacket card prices on the average vary from 2½ to 20 cents each or higher. Prices of aperture and jacket cards depend upon quantity and type.

35MM MICROFILM

Newspapers, maps, charts, and drawings are typical of the records that are commonly filmed in 35mm microfilm. Any record that exceeds 16 inches in width but does not exceed 35 inches can be filmed on 35mm microfilm. Usually only a single image such as a newspaper page appears on a standard 35mm frame. The cost for a negative of a newspaper page photographed at a reduction of 16½ is approximately 2 cents per exposure or 16½ cents per foot, on the basis of 8 frames to a foot. This may vary slightly with the method of photographing, the number of frames to the foot, the reduction used, and the quantity photographed. The cost for a positive of the foregoing is approximately $0.0352 when the pages are photographed in large quantities or $0.06 per foot for short runs of 100 to 200 feet.

35mm film can be used in jackets when this method of self-indexing material warrants the increased cost because of the reduction of search time. The jackets can be obtained for one or more frames of 35mm microfilm. The costs of 35mm microfilm are proportionately higher than those of 16mm microfilm, but the same ratio applies to filing and storage costs of the originals before filming.

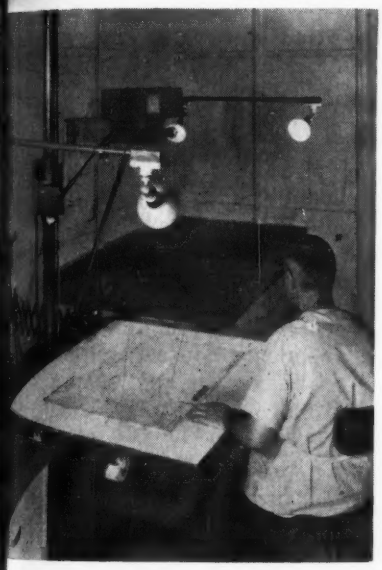
OPAQUE MICROPRINTS PRODUCED PHOTOGRAPHICALLY

Microstrip is the trade name for micro-opaque paper positive prints of 16mm and 35mm microfilm produced by Hall & McChesney Inc. The positive is produced by photographic printing from a supplied developed negative; it is sent in a convenient dispensing box ready for immediate use.

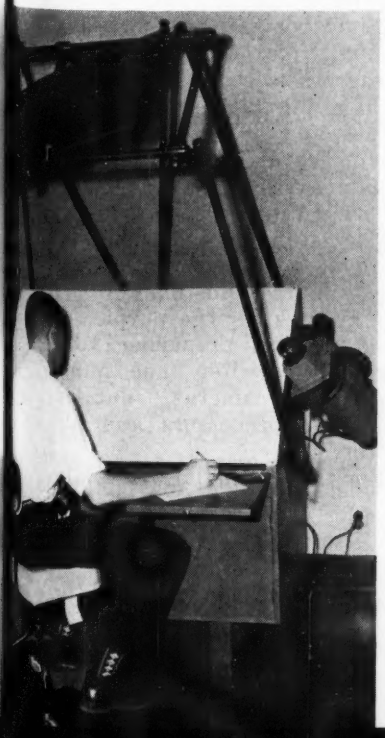
The back of the positive is treated with a plastic-type adhesive formulated for permanence and ease of use. The adhesive is not water-soluble, and the bond has extreme strength and gives flexibility with minimum curl. The positive is applied to card stock of any size by moistening the adhesive. The cards containing the positives

Handy pocket reader is used for reading micro-opaques, in this case Microcards, Microlex and cards made with ribbon micropaper.

Photo below shows setup for a 70mm operation at Ford Motor Co. Technician lays ruler on copy to ensure original-size enlarging.



Microfilmed image of "morgue" clipping is projected onto table of special reader used by The New York Times in its research work.



can be typed or indexed before or after the Micro-strip is applied. The positives come in strip form of the same width and length as the negative supplied.

The Microstrip images can be read in most readers designed for viewing opaque images. Hall & McChesney furnish a modified reader that enlarges at 16x for 35mm filmed at reductions lower than 1:20.

Microtape, the trade name of a product of the Microcard Corp. of La Crosse, Wisconsin, is similar to Microstrip in cost and in use. The chief difference between the two products is in the adhesive used. The Microtape adhesive is a pressure-sensitive tape laminated to the reverse side of the tape. The Microtape dispenser automatically removes a protective layer from the tape and cuts the strips to the desired length. When cut, the strips are merely pressed into position on the file card desired; no moistening is required.

70MM MICROFILM

70mm is a newcomer compared to the other two sizes. Since it is twice the width of 35mm it will accommodate drawings as large as twice the size. In one typical equipment there is a standard aperture which is twice as wide as the maximum image width of 35mm film; it is 2⅝ by 3½ inches and is equidistant from both edges of the film. Since the width of unperforated 70mm film is but a few thousandths of an inch greater than 2¾ inches, about 1/16 inch is allowed on each side of the film beyond the limits of the photographed image. A spacing of ⅛ inch between successive images is used.

70mm film, after developing, is frequently cut into individual frames for filing, or it may be stored in roll form. Most 70mm cameras use an aperture of fixed height, 3½ inches. When 70mm film is cut into individual frames, it is of uniform size and may be inserted in file cards or in film jackets. This operating practice differs from that in 35mm and 16mm sizes where the height of the aperture is usually altered to meet the needs of the document being photographed; the individual frames are not of constant size owing to their variation in height from one frame to another.

In practice, 70mm film is photographed with reductions ranging commercially from a minimum of about four to a maximum of about 14. For engineering drawings it is customary to use a magnification in the reader which matches very closely the reduction of the camera so that drawings so displayed are reproduced to scale. In such

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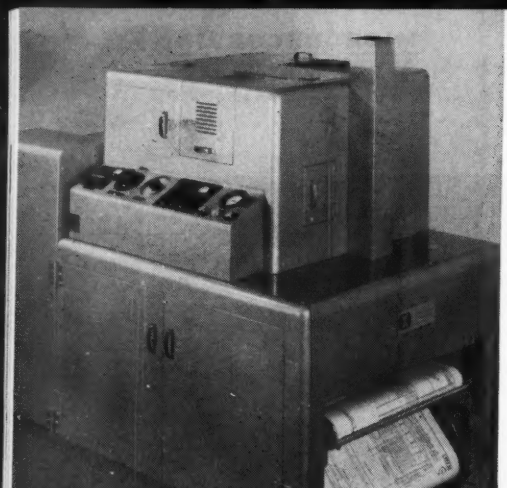
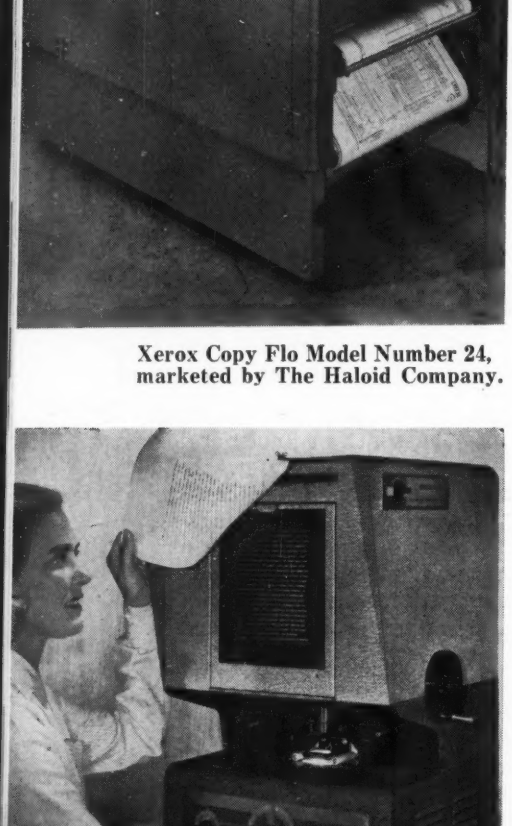
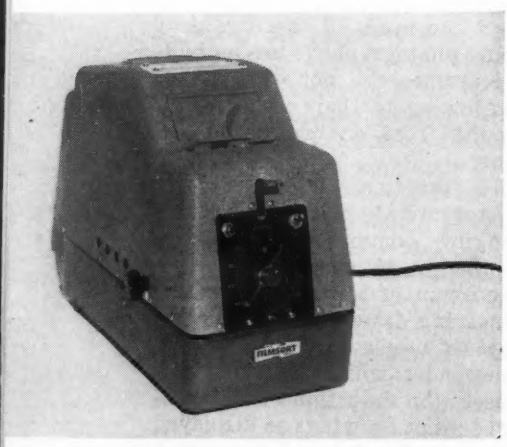


Xerox Copy Flo Model Number 24, marketed by The Haloid Company.



The 3M Reader Printer developed by Minnesota Mining & Mfg. Co.



Filmsort Company's Uniprinter employs the Kalvar principle.

What's in the future

All signs indicate a bright tomorrow for the microrecording industry as its research pays off in an expanded market for its improved equipment.

by ERNEST P. TAUBES
Photo Devices, Inc.

Until the end of the war, only records which had a low reference factor were microfilmed. Since then, however, tremendous strides have been made in developing methods, applications and equipment which make it possible to use microfilm as a daily tool.

These new applications were possible to a great extent because microfilm was taken out of the roll that it was confined to these many years and placed as an individual image or a connected strip into jacket or aperture cards. This unitizing of microfilm made it possible to find a single document in a matter of seconds by automatic sorting machines.

FOUR PHASES

Microfilm is experiencing four distinct phases of development.

The first concerns itself with ever higher reduction ratios, up to 60x, thus condensing records still further and achieving greater space saving.

Phase number two concerns itself with larger film sizes and lower reductions so that even abnormally large documents could be reduced to film and this film used as master to make full-size reproductions.

The third phase concerns itself with combining related documents into a coherent card of opaque micro-images, so that such documents can be easily found.

Phase number four concerns itself with new reproduction methods from microfilm.

Phase number one refers primarily to the Eastman Kodak Minicard system, which combines the high reproductivity of punch card systems with the high information content of microfilm applications.

The Minicard is a piece of photographic film 16mm wide by 32mm long, which carries digital information in the form of clear or opaque dots and, in addition, may carry images of documents. The readable area of the Minicard can be used for code or images in any desired proportion. A single Minicard may contain up to 12 image areas. Each area may be a record of a copy equivalent to a legal-size page 8½" x 14" in size. With 12 images on a Minicard there is still space for coded information for manipulation purposes. Provision has been made to handle a group of Minicards together in the operation of the system.

Minicards are not handled manually but on metal sticks. These sticks serve as a means of handling cards between machines and of entering or removing cards from the files. A standard stick has a capacity of 2000 Minicards.

The following pieces of equipment have been developed in the Eastman Kodak laboratories for the purpose of handling and preparing Minicards: typewriter tape punch machines, cameras, duplicators, film processors and film cutters.

For the manipulation of Min-

icards, the following equipment has been developed: fine sorter, block sorter, selector.

For the use of Minicards: viewers, code printers, enlargers and print processors.

The Burroughs Division of the Burroughs Corporation has released two new microfilm cameras: the "B and H 205F (Micro-Twin) Recorder" and "B and H 205G Flat Top Recorder." Both have a reduction ratio of 44 to one, highest in the industry outside of Eastman Kodak Minicard system, and both have a greater capacity of documents recorded per roll of film than any other recorder presently used for duplex method of photography. Burroughs also has released a portable microfilm reader which weighs only 16½ pounds.

70MM AND 105MM

Phase number two concerns itself with the development of 70mm and 105mm systems and equipment.

The 105mm system was originally developed by the Photostat Corporation for the Micro-Master Co., Kansas City, Mo. The Eugene Dietzgen Company recently announced their Micro-Fax System, which includes a continuous 70mm and 105mm camera that permits the continuous exposure of extremely long documents on one film frame.

These large film sizes reproduce engineering drawings, maps and other large documents so accurately and faithfully that, together with the new dimensionally stable film bases announced by the E. I. duPont deNemours Company, micro reproductions can be used as masters for any subsequent duplicating process.

Phase number three includes Microcards, Microtape, Microtak, Microprint and Micropaper. All these names refer to micro-opaques, where the image is produced on opaque paper.

A Microprint card contains a series of opaque microfilm images; for example, all the pages of a document can be combined into one card, which can be easily filed and found.

Applying tape which has been treated with a pressure-sensitive adhesive permits the production of a card depending on the length of the document; that is, a 3 x 5 or 5 x 8 or 6 x 6 card can be put together by simply pasting this tape, which might be 16mm or 35mm wide onto a card backing.

New applications for the use of micro-opaques are being developed which carry it outside of the archival and library field for the first time.

The Microlex Corporation of Rochester, N. Y., has developed a system of reproducing signature cards for banks in a microcard form. As many as 400 signature cards can be combined on a single Microcard. The system also permits the easy distribution of duplicate card files to branch offices.

A new continuous contact printer was developed recently by Photo Devices, Inc., of Rochester, N. Y. It permits the easy duplicating of a Microtape or Microtak at a rate of 25 feet per minute. This printer combines in one unit the ability to print 16mm, 35mm or 70mm microfilm to positive film at a maximum speed of 75 feet per minute together with the printing of Microprint paper.

Phase number four—developing new methods to reproduce readable size copies from microfilm—has seen the biggest advances in the last few years.

Entirely new photoduplicating methods employing new principles of photography make it possible to produce readable prints in a matter of seconds without the use of darkrooms and at a reasonable price. These methods include Xerox, Electrofax, Projection Verifax and the 3M process just announced.

Presently announced are conventional microfilm readers equipped to handle aperture cards and, in some instances, microfilm in roll form. At the same time they permit, at the option of the operator, production of readable size images.

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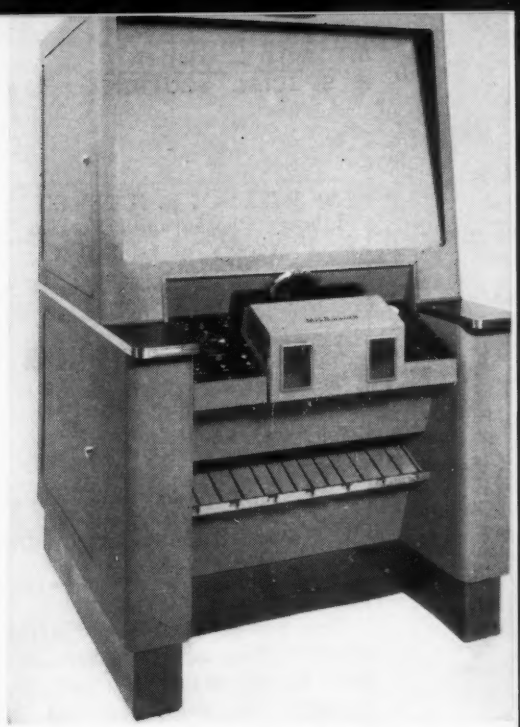
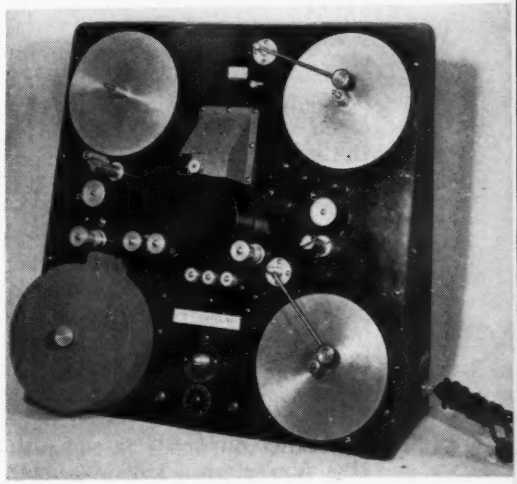
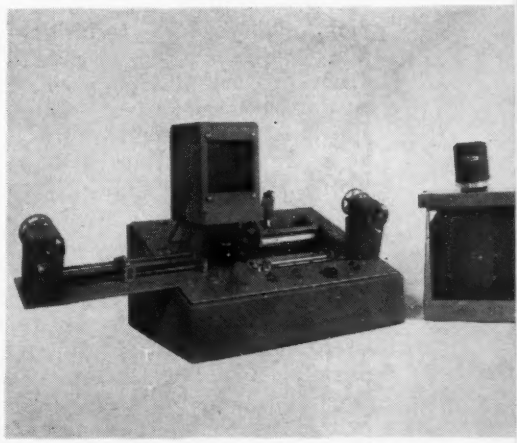


Ozalid's Micromatic will produce images up to 18″ x 24″ in size.



New continuous contact printer developed by Photo Devices, Inc.



Actifilm Printer produces transparency sheets up to 6½″ x 8″.

by WILLIAM R. HAWKEN
Library Photographic Service
University of California

NEW TRENDS IN making prints from microfilm

New printing processes have made the use of microfilm as an intermediate for duplicating documents exceedingly attractive.

The use of microfilm for the preservation of valuable records is only half the story. An equally valuable function is the use of microfilm as a low-cost, rapidly produced intermediate for duplicating documents either in microform or in reduced or full-size facsimile.

We now have automatic continuous "dry process" enlargers which are threatening to catch up with our cameras in the speed with which they can turn out enlarged facsimile prints—a far cry from the one - print - at - a - time - in - the-darkroom routine. Between these two extremes a number of other methods of printing from microfilm have been developed to meet a variety of needs.

One of the oldest printing mediums and still one of the best for many purposes is the positive film print. Until recently most duplicate film copies were made on fine-grain motion picture positive stock which was wet-processed by the usual motion laboratory techniques. This yielded a positive print from the original negative. If a duplicate negative was required it was necessary to go to a third generation with consequent loss in definition.

NEW METHODS

We now have diazo-type film printers which rapidly produce duplicate negatives in a single step either from film in roll form or from individual frames mounted in unitized cards, without the elaborate processing machinery required for silver emulsions. Another newly developed continuous process for film-to-film printing is "Kalfax" — a completely dry process which utilizes ultraviolet exposure of a special emulsion followed by infrared development.

Microfilm as an intermediate has made possible the various micro-opaques such as Microcards, Microlex and Microprint, which have come into widespread use in business, industry, libraries, and research organizations. Micro-opaques have provided a relatively inexpensive means for publishing or reprinting scientific and technical reports, law reports, patents, and an extensive body of important literature in the sciences and arts.

Only a few years ago the only method of producing enlargements from microfilm was by projection printing on silver emulsion papers processed by the usual wet methods in a photographic darkroom. Where quantities are not great, speed is not too important, and a photographic laboratory is available, such hand methods are very useful. Moreover, the quality of the prints produced by this method is unequalled by any other printing process. A life-size enlargement from a 35mm microfilm of a newspaper page will show every halftone screen dot. From microfilm copies of engineering drawings full-size enlargements can be made on translucent paper which can then be used to make blueprints or diazo-copies.

To meet the demand for greater speed and economy, printing on silver emulsion papers was mechanized. The V-mail and Airgraph services instituted during World War II, through which millions of letters were microfilmed at their point of origin and enlarged to half size at their destination would have been impossible were it not for the development of high speed automatic continuous enlargers and processing machines. Variations of this equipment were later used in numerous other applications.

LIBRARY OF CONGRESS

The Library of Congress, for example, faced with the problem of bringing up to date their National Union Catalog after the war, had hundreds of thousands of library catalog cards filmed at various research libraries. These films were then sent to the Library of Congress' Photoduplication Service where they were enlarged to card size on V-mail type equipment for interfiling in the National Union Catalog.

Despite these mechanization advances the demand for faster production at lower costs persists. To achieve these ends much research has been directed toward the development of "dry" processes which would eliminate the time and expense of developing, fixing, washing and drying, and at the same time eliminate the cost of installing and maintaining a photographic darkroom.

Another phase of recent research has been concerned with methods of producing

images by photographic means on ordinary papers in normal room light instead of on papers specially coated with the relatively costly light-sensitive emulsions which require darkroom protection. A "giant step" in this direction was "xerography," a completely dry electrostatic process developed jointly by The Haloid Company and the Battelle Memorial Institute. Haloid has now perfected the "Xerox Copyflo" machine which automatically enlarges microfilm images on a continuous roll of ordinary sulfite paper at a speed of 20 feet per minute.

ELECTROFAX PROCESS

RCA, also experimenting with electrostatic methods, developed the Electrofax process in which paper coated with a photoconductive layer of zinc oxide in a resin binder could be used to form an electrostatic image directly on the paper itself instead of transferring the image from an intermediate photoconductive surface as is done in xerography. One of the first applications of Electrofax was an automatic microfilm enlarger for the reproduction of engineering drawings.

Both of these automatic enlargers are at peak efficiency when long runs of consecutive frames are being reproduced. Another problem, however, which constantly occurs wherever microfilm is used is the reproduction of a single document or a few random pages from a reel of film which might contain anywhere from 500 to 5,000 frames. Usually this means locating the desired documents by means of a microfilm reader and then sending the film, suitably marked, to the photographic laboratory for printing. Attempts to print directly from a reader screen on ordinary projection papers or diffusion transfer materials have not been notably successful.

Recently the Minnesota Mining and Manufacturing Company brought out a microfilm

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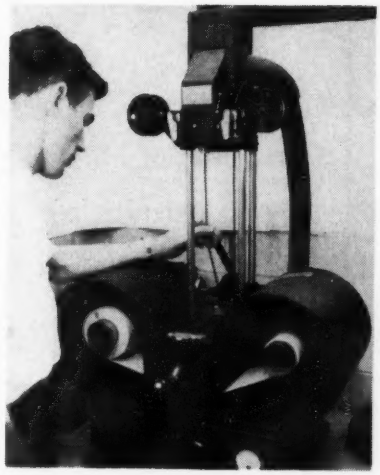
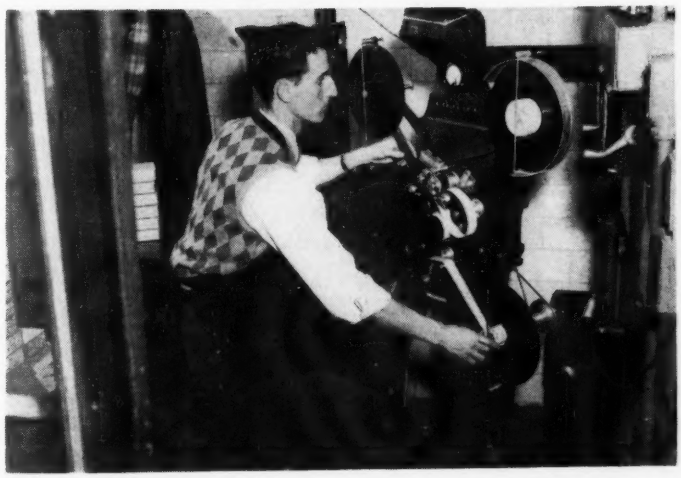
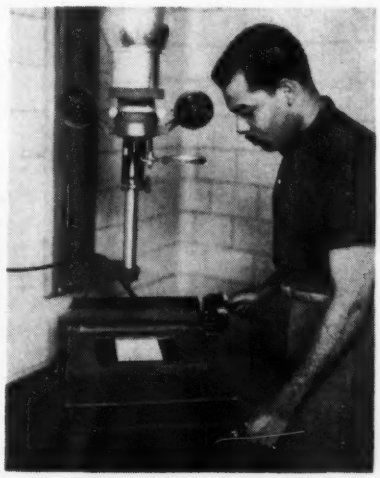
MICRORECORDING AT THE LIBRARY OF CONGRESS



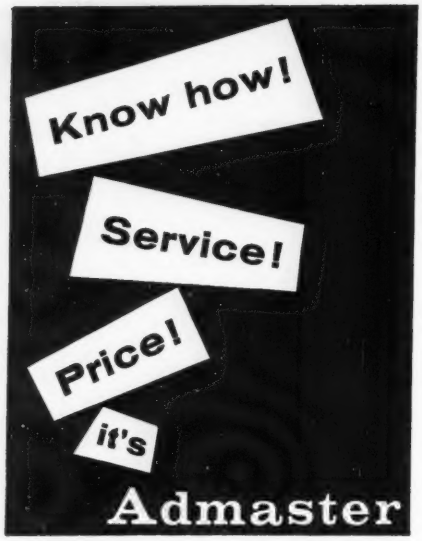
At the Library of Congress facsimile prints from microfilm are made on a continuous roll enlarger printer. Microrecording is the heart of the Library's extensive Photoduplication Service.



Operator makes positive film copies from negative microfilm. Many copies are required to fill exceedingly heavy demands.



Large prints of selected microfilm frames are shown being made on roll paper. Last year 402,500 such paper enlargements from microfilm were supplied on order by the Library's Photoduplication Service.



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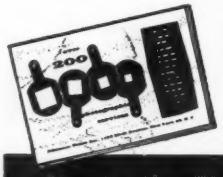
Duplicate Chromes	1.00	2.00
HAND COLORING	2.70	2.70

*Image does not exceed 8 x 10
Prices quoted above are **mounted** slides.



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. . . for more details circle 501, page 81

Micro-photographic x-ray copying

By providing bases for comparisons, reference files of industrial radiographs on microfilm permit closer control of product quality.

by PETER H. COVERT
Atlantic Microfilm Corp.

A great deal of the increased use of x-ray, in recent years, is attributable to business and industry. This situation has exhibited itself in two main areas: 1) the company health department where a medical x-ray department functions routinely and 2) in industrial analysis of metal parts and castings as well as quality control.

A surprising number of both types of radiographs are retained for permanent reference. In foundries, for example, x-ray records of previous casting jobs are invaluable when a plant is called upon to make duplicates. It is easy to compare the soundness of newly cast parts with those accepted on a previous job. Also, a radiographic record of the evolution of practice changes made on a long-run job is helpful, particularly in the event of pattern redesign.

Retention of these industrial radiographs for any period of time can create a serious storage problem. Fortunately, from a photographic aspect, sensitized materials are now available which faithfully record the complete range of densities found in the original radiographs. Equipment and automatic film processing techniques have been improved to a point where the cost of microfilming is but a fraction of that of other photographic copying methods.

ACCOMMODATE 100′ ROLLS

One of the newest cameras available for microfilming x-rays is designed to accommodate 100′ rolls of 35mm Type X microfilm —allowing for 750 exposures per roll. Each frame will cover a full 14″x17″ x-ray reduced approximately 12 to one. Smaller x-rays can be grouped together over the 14″x17″ area for a single 35mm image.

The x-rays are illuminated from below by a cold-light source and overhead copying lights are used to photograph identifying reports or envelopes in which the films are contained. A simple foot switch automatically actuates the film cycle motor causing exposure and film advance in about one second. An automatic alarm system warns of improper film movement, film exhaustion, etc.

TWO-FILM METHOD

The best microfilming technique for copying radiographs is the two-film method (although reversal films are used at times). Under the two-film method, the first film copy is a reverse-tone of the original radiograph and is usually referred to as the intermediate. The duplicate, or reference copy, is the same tone as the original radiograph. Some advantages of this method are:

1. Any number of duplicates can be made from the intermediate.
2. Duplicates of any size or type can be printed by projection from the intermediate.
3. Tonal quality is usually considered better.
4. Cost of the two-film method compares favorably.
5. The intermediate can be stored elsewhere as a security copy.

For best results in duplicating the contrast and detail of the

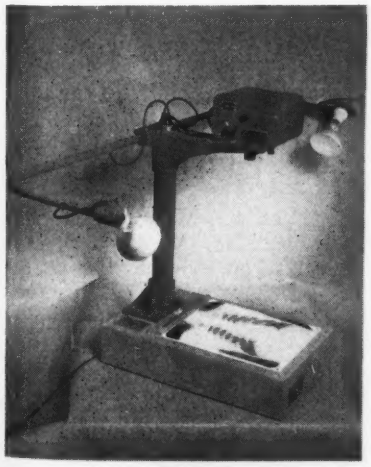
original radiograph, Microfile film, Type X, should receive carefully controlled machine development in solutions comparable to D-76. It can be processed by the user or by a qualified commercial processor specializing in this type of work. The latter expedient is definitely recommended, since the precise treatment needed to produce proper image quality in a large volume of work is really a professional laboratory procedure.

Since specialized equipment is needed to make accurate duplicates from the intermediate, use of the facilities of the commercial laboratory is also recommended for this work.

VIEWING DEVICES

There are several types of suitable viewing devices on the market. One of them projects the image onto an opaque screen. This has the advantage of large-audience viewing with any degree of magnification possible. Other viewers project the image through an optical system to a mirror from which the image is projected onto a groundglass screen.

Normally, the rolls are filed in cartons on which can be written identifying data. The film rolls are then special microfilm file cabinets compartmented for this purpose. Where individualized filing of film images is required for special comparative purposes, cards or "jackets" which hold individual strips of film are available. □



Recently introduced x-ray microfilm camera. It can take 100′ of 35mm Type X microfilm and gives 750 14″ x 17″ exposures per roll.

FILM-A-RECORD

TRADEMARK

FILM-A-RECORD microfilming of records is systemized for easy, economical and space-saving recordkeeping. Speed of reference and flexibility of equipment is unsurpassed. Modern Remington Rand microfilm methods are quickly and easily adapted to any business or profession. All types and sizes of printed or written records, charts and drawings can now be organized into an integrated and remarkably compact system.

The full Remington Rand microfilm line includes cameras, readers, feeders, stackers, enlargers, film and all kinds of filing equipment and supplies . . . every microfilm need from one source. Twenty years of experience in the microfilm field PLUS eighty years in business systems guarantees smooth performance and peak efficiency.

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☐ **Same day film processing.** Your Recordak microfilms are processed the same day they are received at local Recordak processing center. High-speed professional equipment staffed by specialists—and quality-control techniques—assure top-quality results.

☐ **Prompt servicing of equipment.** If inspection of your films ever indicates your Recordak Microfilmer is not operating efficiently, a Recordak service technician is dispatched immediately. All service calls handled promptly!

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Oklahoma City 2, Oklahoma
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RECORDAK

(Subsidiary of Eastman Kodak Company)

originator of modern microfilming—*now in its 30th year*

. . . for more details circle 601, page 81

Microrecording proves valuable ally of industrial librarians who find their facilities taxed by the swelling volume of technical and scientific literature.

Strips are cut from ribbon micropaper and stuck to filing cards that fit a particular company's system.

MICRORECORDING AND ITS *uses in research*

by HUBBARD W. BALLOU
Columbia University

To the man in the street, the term "research" usually suggests a scientist in a long white coat fiddling with a lot of glass tubing, or peering with myopic intentness at a giant cyclotron. He does not envisage the many hours of work spent in the library or at the scholar's desk, looking up the results of similar research done in other parts of the world.

Nevertheless, the increased amount of time and money being devoted to industrial research has meant the setting up of libraries in all but the smallest industrial companies. Some of these are only a corner of a room in the administration building, but many of them have quarters and book collections that are the envy of librarians in public and academic libraries.

GETTING AND KEEPING

The librarians in these industrial special libraries face the same problems of getting and keeping materials for their clients as do any other librarians. The flood of research material coming out of laboratories is swelled by the increasing spate of technical and scientific magazines. As it is impossible to buy all the literature that their people might want, they must get what they can and depend upon inter-library loan or photoduplication to fill in the gaps. From about 1915 to 1935 these photoduplications were projection photocopies, such as the Photostat. Since 1935 there has been a slow but steady rise in the use of microfilm and, more recently, micropaper.

In his book *Technical Services in Libraries*, Maurice Tauber has suggested that the five principal uses for microreproductions are: condensation, acquisition, preservation, distribution and publication. Any library that is pressed for space, and industrial libraries certainly are, will welcome the ability of microphotography to shrink bulky volumes down to economical size. Those libraries that have difficulty in acquiring materials which are of an esoteric nature or which are scattered over the face of the globe, will welcome the aid of microfacsimile. Industrial libraries make great use of materials of an ephemeral nature—mimeographed reports are usually on paper that does not last very long—and microcopies can extend their life immeasurably. Inter-library loan has been one answer to the need for greater distribution of research materials; and many libraries that are hesitant about sending rare items away, are willing to have them circulate in microphotographic form. Publication is essential for spreading the results of research, but it can be very expensive in the case of materials of limited demand. Microfilm and especially micropaper have been one way of breaking this bottleneck.

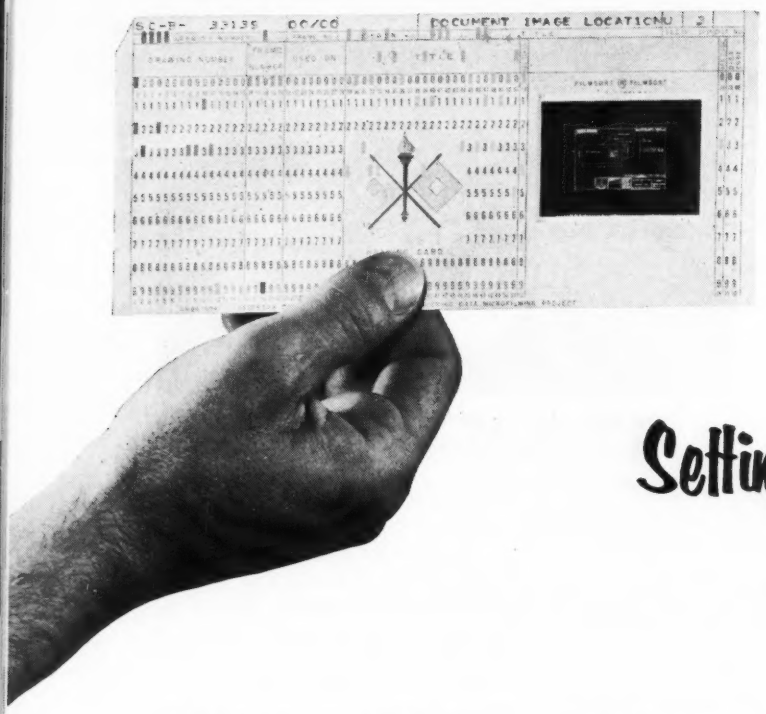
Among the first large projects for research microfilming was the copying of back files of our principal newspapers. Many libraries now keep back issues—a valuable research tool — in this form. Micro Photo Inc., Cleveland, probably has the largest assortment of newspapers available on film.

Magazines and other forms of periodical literature are essential to research. They are expensive to acquire (especially if out-of-print), cost a lot to bind, and use up valuable space in the library's stacks. University Microfilms, Ann Arbor, is a leader in this type of filming. They have also pioneered the microfilm publication of Ph.D. dissertations, a prime example of research materials.

GOVERNMENT REPORTS

Micropaper got its start from the copying of government reports, another valuable research tool. Readex Microprint, New York, began with the British Sessional Papers. They are currently copying certain U. S. government publications, United Nations documents, and a new series of papers on nuclear science. The Microcard Corporation, West Salem, Wisconsin, got started on out-of-print materials in the social sciences but grew strong on the microcarding of the Atomic Energy Commission reports and similar government research publications. They are currently publishing many of the reports of the IGY.

continued on page 56



Microdealers, Inc., has advocated a method of individualizing microfilm which provides engineers with cards bearing both film frame and index.

Setting up a Filmsort system

by RICHARD W. BATCHELDER
& KARL ADAMS

The development of Filmsort is one of the most important of the movements directed at facilitating the use of active microfilm.

In this process, individual frames of film are cut from a roll and mounted into cards by a machine. The cards, on which are written the full case histories of the individual drawings, can be separately filed and interfiled, indexed or cross-indexed. Depending on its particular requirements, a company may use IBM cards, McBee Keyport cards or standard index cards.

LITTLE EFFORT

It is quite simple for an engineer to pull several hundred Filmsort cards from a file, each containing a drawing, and in a matter of minutes find the tracings applicable to his need.

At Otis Elevator, where all reference is to microfilm in Filmsort cards, we understand the number of misfiles has sharply decreased since the system was adopted; cost and usage of print paper has dropped and there has been a saving in the time which used to be spent to patch up tracings damaged through excessive handling.

All microfilm-Filmsort systems are comprised of two fundamental programs. The first is the microfilming and the establishment of Filmsort cards for a company's backlog of engineering tracings. The second is that of keeping engineering drawings current with the new system.

Cost studies indicate that unless a company has a backlog of something like three-quarters of a million tracings, it probably will find it most economical to have a microfilm service company do the work for them.

The first step in setting up for a microfilm Filmsort system is to have the engineering drawings arranged in their proper file sequence. The drawings should be inspected and the damaged ones repaired.

After the filming has been accomplished, the film must go to the laboratory for proper developing. Next, it must be optically examined. This should be done upon a reader which blows the image back as near to full size as possible, so that any imperfections may be picked up. This inspection should be done frame by frame.

Once the negative, which is the master, has been approved, a positive or Ozalid duplicate microfilm copy is produced for reference. The negative should be stored in a safe location for a security file. The duplicate microfilm is mounted into Filmsort cards. Clerks then post the drawing number, type the legends and any other information that may be needed directly on the cards.

TYPES OF VIEWERS

To refer to the cards, the engineering department will require one of two types of viewers. Either a small desk type or a larger unit which will project back to full-scale, tracings which were originally 24 x 36".

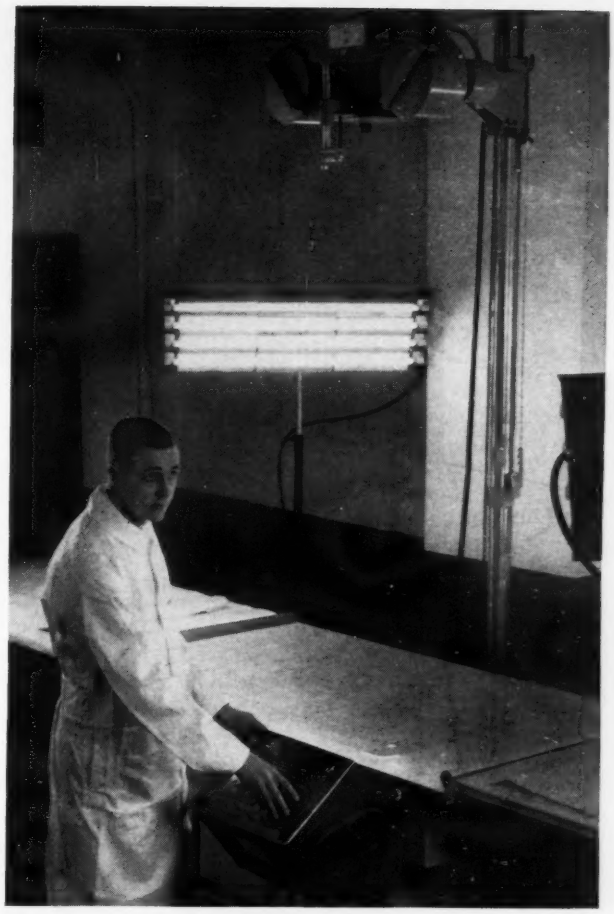
Much of the credit for the spread of Filmsort must be given to the affiliates of Microdealers, Inc. These companies have pioneered the development of the method. Microdealers is a network of independent microfilm service companies organized to facilitate microfilm research and to provide customer service on a national basis. Through the exchange of information, processes and techniques which had formerly been localized in their uses have been extended to many parts of the country. Contracts have been made with national concerns which have plants and offices throughout the country and want uniformity of product but prefer close association with individuals performing the work. □

now... from K+E

for industry, a *complete line* of miniaturizing equipment including these unique developments:

MICRO-MASTER* **105 mm** . . . the first complete film system designed specifically for engineering drawings.

HELIOS ENLARGER . . . the first successful microfilm projector for low-cost diazo paper.



MICRO-MASTER 105 mm produces negatives in the size the engineering drafting field can use to best advantage, gives distortion-free reproductions of 36" x 54" drawings (or even longer). Restores smudged or worn originals, provides archival quality negatives which require 1/25 as much storage space as original drawings.

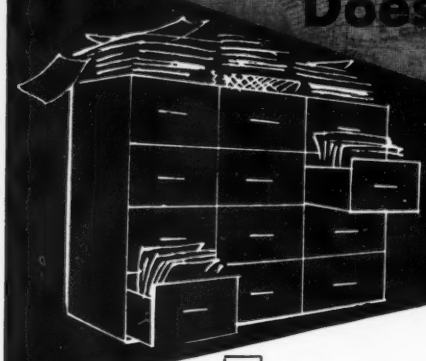
*Trade Mark

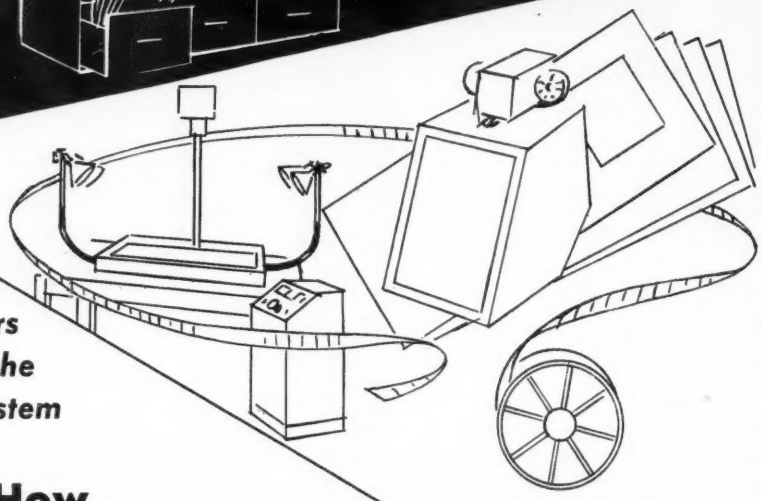
HELIOS® ENLARGER was designed to produce rapidly sharp, distortion-free 8½" x 11" enlargements of 35 mm negatives (either mounted or in rolls) using diazo paper at 1/5 the cost of silver emulsion paper. Larger units will be available handling negatives up to 105 mm in size for enlargements up to 18" x 24".

KEUFFEL & ESSER CO. Hoboken, N. J.

. . . for more details circle 618, page 81

Does Your Problem Need A Qualified Microfilm Consultant?*





** Microdealers Pioneered the Filmsort System*

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Your Microdealer is a microfilm engineer. For example, the present-day Filmsort system is an outgrowth of the first installation of unitized microfilm by one Microdealer, with improvements resulting from the cooperative "know-how" of all Microdealers. Thoroughly familiar with every phase of microfilming, your Microdealer will carefully analyze your problem, and recommend the most efficient—most profitable solution for you. There is no obligation for this service.

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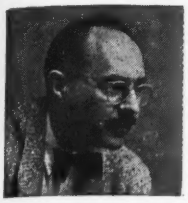

Industrial Workshop

by DAVID B. EISENDRATH, JR., Technical Editor

SOME COMMENTS ON MICROFILMING

The battle of big camera vs miniature is not confined to the photographer choosing equipment for in-plant assignment and reportage; it exists also in the field of microfilming. Here, however, there seems to be one major variation in viewpoint: instead of the trend being to miniature and sub-miniature sizes, there seems to be a strong movement toward bigger sizes particularly in industrial applications where engineering drawings are concerned. The resolution of the problem remains pretty much the same, though, or so it seems to me, and depends a good deal on just what you want to do with the end result. Of course, money, time, and space are important considerations, too, as they are in every kind of industrial photography, but some of the answers must depend very much on realistic thinking and evaluation.

There seem to be several governing factors on just what purpose you may have for microfilming: you may want merely to debulk files and records, destroying originals, and retaining the same data in condensed form. You may want microfilming to safeguard information in case originals are destroyed or lost. You may be seeking archival storage of materials that will probably not be needed for future use, yet must be available *if* needed. You may also like microfilm because of its adaptability to making statistical data, records, and technical information available in more than one place at a time for convenience of users.

I use the word microfilm loosely, and include most all phases of microphotography. How do you want your microtext? On cards? On film? On aperture cards? It seems to me that the answer must depend on the material being recorded and the ultimate use. Bank checks, for example, are filmed for record purposes. Using systems like Recordak's single posting bookkeeping, microfilm is used for record purposes, occasionally referred to for examining discrepancies, rarely used (in proportion) for making reproductions.

Data Books Converted

Only under remote circumstances would individual exposures be removed from a completed record. On the other hand, text and data books might be converted to microtext and reproduced on Microcards so that compact reference material is available at many locations. Periodicals and newspapers are filed by issue and date—again a good justification for recording and using by unit.

However, technical information, entire libraries, statistics, and other matter which might lend itself to complex inter-correlation, are all subjects that demand some sort of handling where machine searching and automation can be helpful. Any material which would be used in *multi-dimensional* searching is a natural for a microtext and some system of handling so that it can be machine located. Complex targets, such as "all references to sleeping sickness in girl babies in Nigeria", or "bibliography reference to research done on vanadium alloys in 1941 which ended in patents" and other such impossible research tasks are solved quickly and efficiently by proper coding and searching. Leases, patents, legal proceedings, miscellaneous information that may eventually be inter-related, all are admirably suited for such systems.

It becomes apparent however that the one governing factor of what kind of microfilming to do and what size, depends not only on subject matter, but on ultimate use. Although the various authorities in the field vary slightly on the exact figures, it would appear that the ultimate answer lies in the problem of: do you want mere legibility? Is just being able to read it going to be good enough? If so, then reductions of as great as 30 times will probably be permissible, although this may require some acceptability by the reader.

If prolonged periods of reading may be necessary, perhaps slightly less reduction would be preferred. Is reproduction of the original going to be an important factor in the medium chosen? In this case, most of the experts agree that 20 times is probably as great a reduction as you can use for production work and get consistantly acceptable reproductions.

So far it looks like just a simple case of mathematics—a 220mm bank check will easily be copied on a piece of 8mm (split 16mm) microfilm, a 370mm newspaper page will be easily read from 16mm, reproduced from 35mm. Which may bring some eyebrow raising as to just how and why anyone is interested in 70mm and 105mm microfilm at all.

Discover Duplication

The microfilm engineers concerned with the recording of engineering drawings have come up with a whole new set of values. Not only do they want to microphotograph engineering drawings to reduce bulk in storage and to safeguard the information, but they have discovered a new kind of reproduction: duplication. Engineering drawings may sometimes be satisfactorily copied on 35mm when retention of information is the sole intent, or when there is very remote possibility that prints will ever have to be made other than for mere inspection

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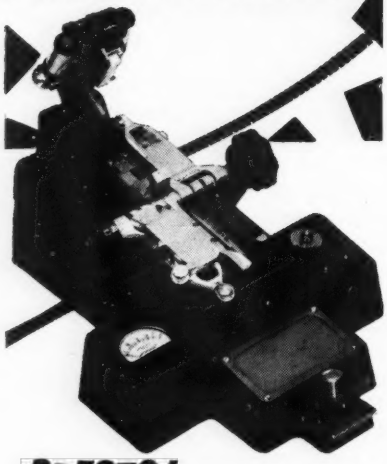

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Graphic Viewpoints

by EARL STANTON

POINTERS ON MICROFILMING ENGINEERING DRAWINGS

Microfilm is finding wider and more money saving uses in industry. Manufacturers are constantly working on new emulsions to give the higher resolving power which this writer feels will further advance the use of microfilm.

There are several mediums available to make blow-backs from microfilm negatives and one of the newest is the electrostatic discharge papers more familiar to many of us under the name Xerox. Xerography certainly is not new but some of the advances of this material and uses of the medium are relatively new and startling.

I've pointed out before in this column that microfilm never attained the many uses it should have found long before this. I know many reproduction people throughout industry who still are unable to make up their minds which size microfilm equipment should be purchased, rented or used in their particular applications.

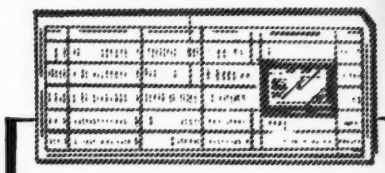
For the majority of work especially along the line of filming engineering drawings my personal feelings are very definite that 35mm is the most practical and useful size to use. Talking dollars, and who isn't right at this time, I feel that 35mm is just about the most utilitarian size. It's a little easier to handle than its cousin 16mm and for the most part microfilm firms are set up to handle 16 or 35 and most of the larger labs needless to say are also set to handle 70mm.

It's amazing the quality of the blowbacks one can now attain from drawings filmed on 35mm microfilm and then printed back either full size or half size.

Once the drawing has been filmed on 35mm microfilm its handling becomes a simple matter. You have a master negative with 1440 frames per 100 feet of film. That, if you stop to think, is a lot of drawings on 100 feet of film. The wise thing to do is to have duplicate positives made and placed in aperture cards. These cards can be punched and very easily filed in a minimum of space. The master negative can be duped and the dupe negative used for blowback purposes with the original negative filed in a safe place—most likely hundreds of miles from the plant.

Required Procedure

I believe this policy was set as required procedure some time ago by various government agencies and certainly was a very wise move. But looking at this overall picture it makes little difference if a plant is building defense products or any other item. Engineering drawings are the very life blood of any manu-



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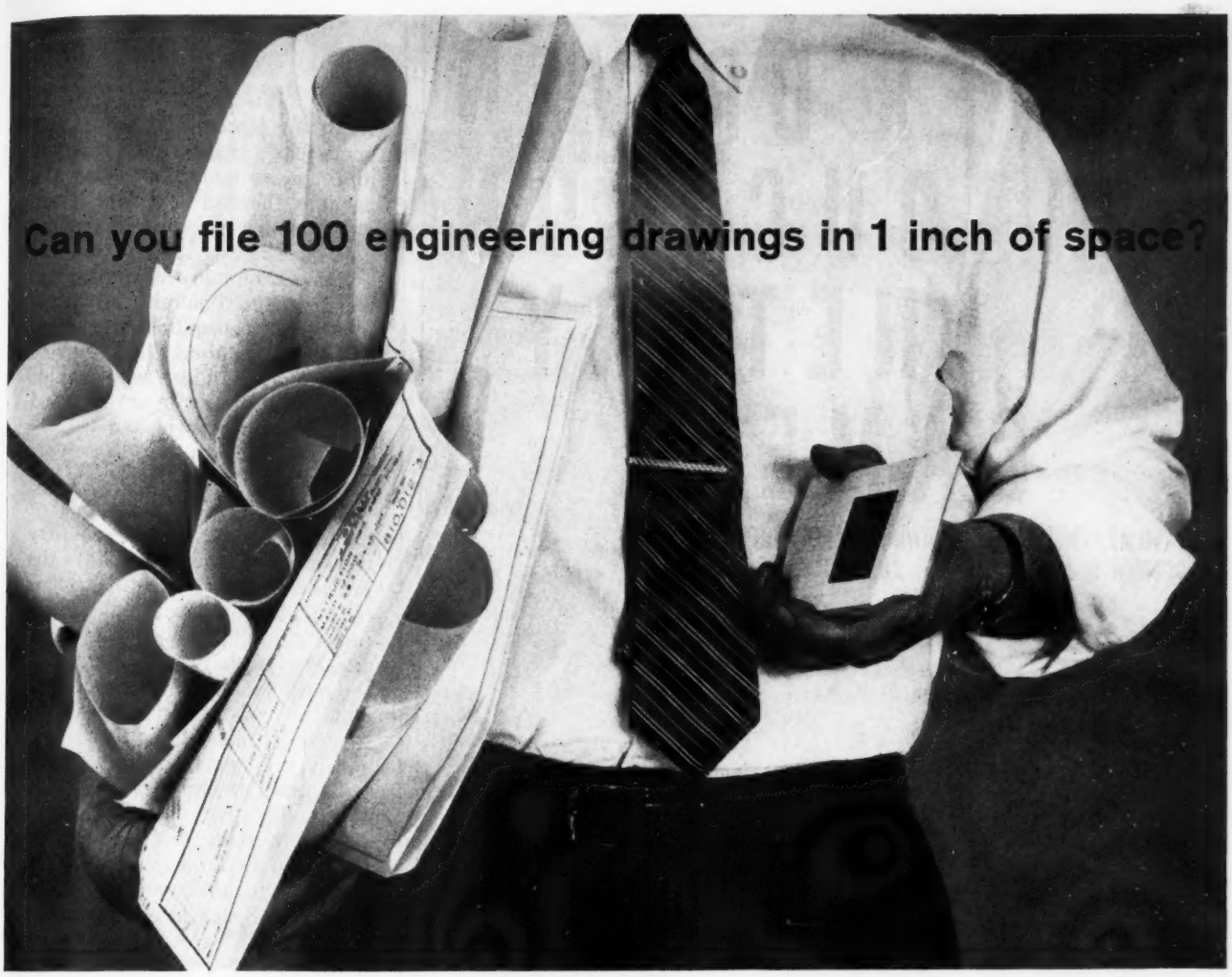

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facturing business and it is just good business to protect them. It might mean months of delay and perhaps the end of a firm if fire were to destroy its blueprints and records.

Some time ago this writer did a column on insuring all drawings with reproducible masters and this goes along the same line of thought. The reproducible masters are very important and should not be overlooked.

Protecting Drawings

I think if the thousands of manufacturers in this country were to stop and investigate the protection given their life blood in business—engineering drawings—these firms would be badly shaken. Undoubtedly many of the major manufacturers do protect themselves and their drawings with microfilm records but surely not nearly enough industries practice this protection.

Drawings are usually bulky things to store and handle and run in sizes from perhaps 8x10 inches to some 12 feet and longer in length. Space in every factory is a highly priced item. Blueprint files occupy a lot of room and are often scattered over various sections of larger manufacturing plants.

This writer feels that in years to come most progressive plants will reduce their drawings to microfilm, insert the negatives or positives in aperture cards and keep an entire project in a small file cabinet. This same project now stored in full scale drawings and even reduced blueprints might fill a large room.

Once the drawing has been reduced to microfilm the entire field benefits. The prints blown back in the majority of cases are better than blueprints printed from a drawing or a vellum. To inject an item of cost, the average print reproduced on conventional paper such as blueprint or whiteprint paper runs around five cents per square foot. If the microfilm negatives are printed on ordinary paper by the electrostatic medium this cost will run one and one half to two cents per square foot.

If one stops to consider that on many drawings anywhere from 100 to 150 prints are made

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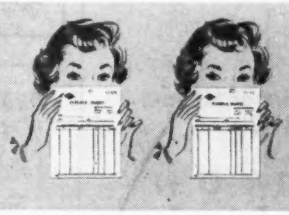

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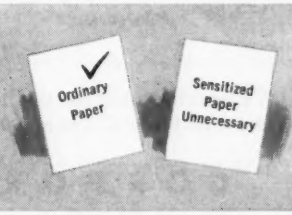

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from the master this cost item over a one year period amounts to a great deal of money. Taking one drawing, two by three feet, the reproduction cost is reduced from 30 cents to twelve cents. If you would stop to consider the thousands of drawings involved in most manufacturing plants this cost item is really amazing.

In summary I would like to point out some of the advantages of microfilmed engineering drawings.

1. Engineers can get old drawings out of file faster for reference purposes—even faster if on punched cards where the drawings are machine sorted.

2. Engineers can refer to drawings at their boards, either on small table-top readers or with hand viewers.

3. The time and cost of making paper copies for referral is reduced.

4. Fewer file clerks can resort the aperture cards faster.

5. Filing equipment and storage areas are reduced by more than 95 per cent.

6. Duplicate aperture cards can be made economically for dispersing to other plants for reference and reproduction.

There are many microfilm experts throughout the country who are available for consultation and discussion on this relatively new method of handling engineering drawings. Any industrial plant would be wise to investigate microfilmed drawing reproductions. I have seen 20-year-old drawings, yellow and faded almost beyond recognition, microfilmed and blown back on electrostatic paper.

Surely no one will make a complete transition from their present blueprinting and reproduction system but this writer does feel that many firms who do not have microfilm equipment readily available should give serious thought to installing it when their present equipment needs replacement or major repairs. □

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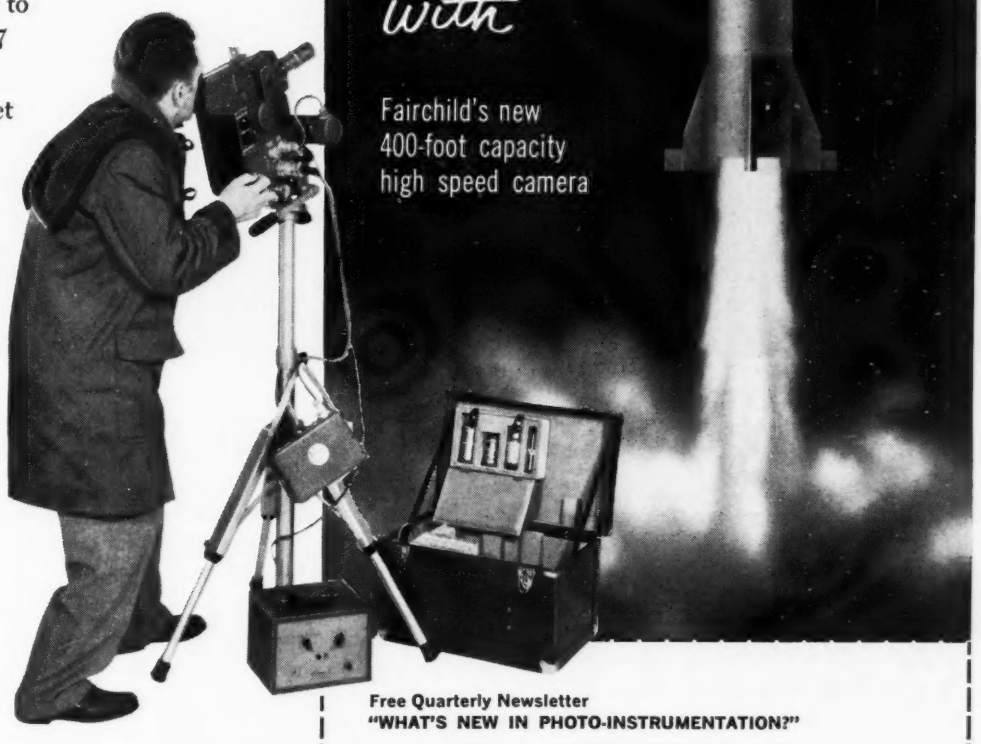

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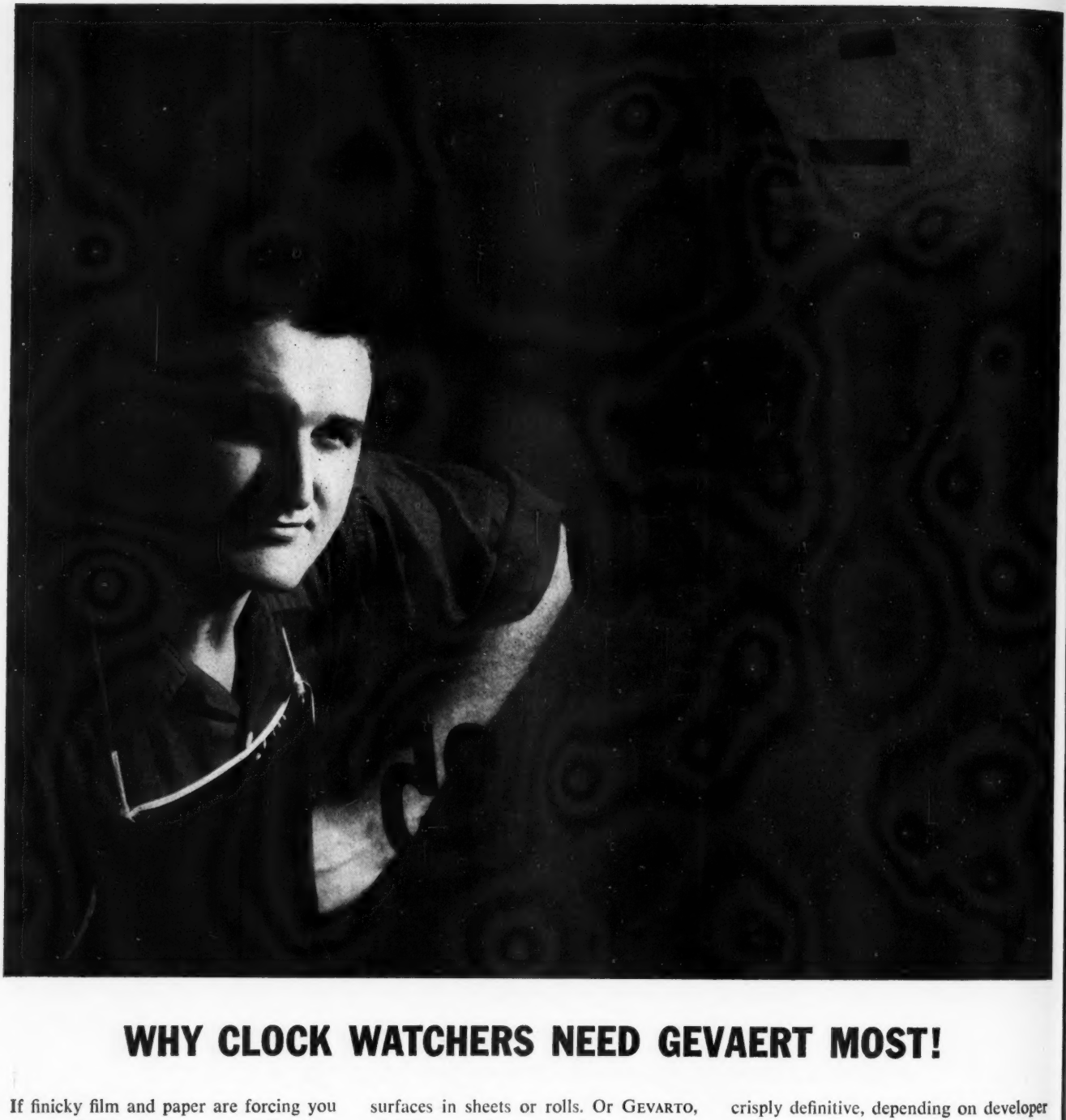

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purposes. However, what the 105mm boys seem to be crowing about is that engineering drawings are seldom used where machine searching techniques would be used for filing and unfiling, they are referred to not as mere reference, but used often as basics for modification, duplication, scale sizes and proportional reduction, as well as physical material to be removed from file. So with 105mm they have discovered all kinds of new advantages and techniques.

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Large enough to be read directly from negative or print without special readers or projectors, 105mm files readily in envelopes, in existing filing equipment. Of course it can be coded and indexed for machine search, though seldom needed. It can be projected directly onto a back-illuminated drafting table viewer with images bright enough to be traced directly onto cloth, paper, or other tracing media. The outstanding feature of the large original seems to me to be the fact that it is large enough to allow manipulation in copying and reproduction with the result that not only is the image capable of enlargement back to original size on a transparent medium with resolution and opacity suitable for excellent reproduction when required, but background dropout can be achieved so that many times the prints made appear to be cleaner and better than originals.

Micro-Master (one of the makers of 105mm equipment) has even gone so far as to call their first reproduction transparency a "second original," and I am not offended by this claim. Using the technique of the 105mm negative as a master negative, it is often a cheap method for making duplicate tracings, allowing one to change scale to half-size or quarter-size prints when needed. Micro-Master points out that it permits for inverting images with equal line quality, and I have seen templates made from half-drawings that were flopped. And of course this size negative is easily

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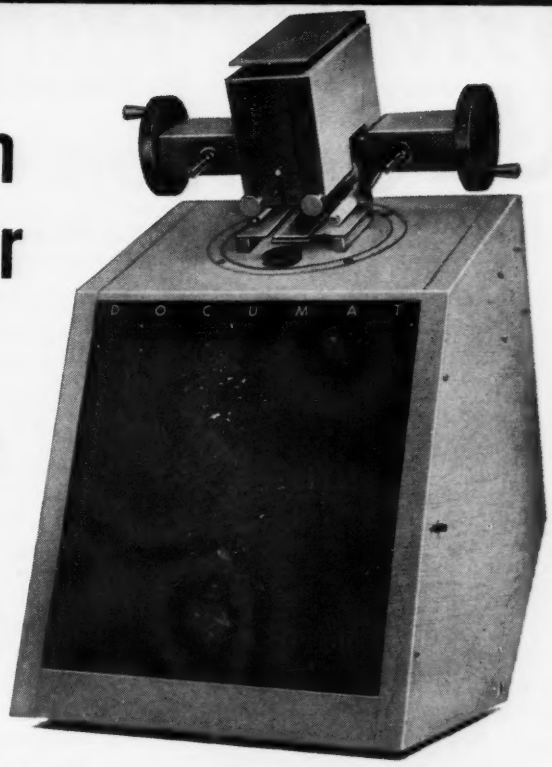

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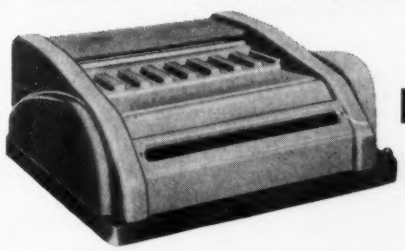

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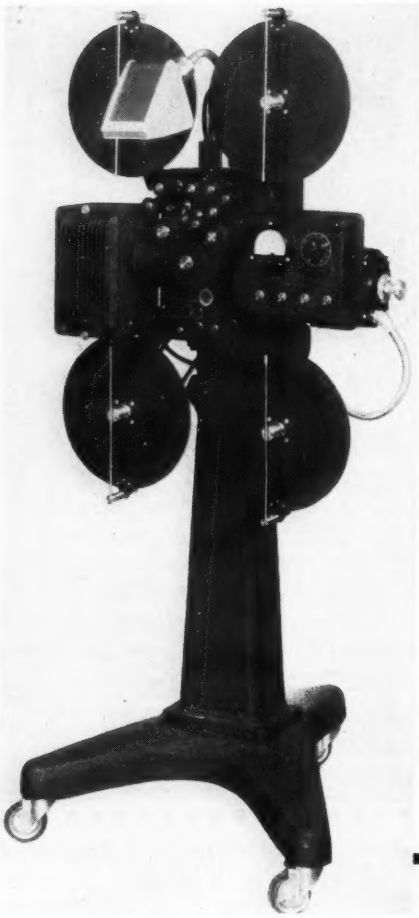

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This improved Depue Microfilm Printer is designed to print perforated and non-perforated black and white film, either 35 mm or 16 mm. The basic machine prints 35 mm. 16 mm is handled with simple adaptation of a few parts. Illumination is provided to expose regular positive film or slow speed fine grain film. Illumination is with 100 watt projection type printing lamp in adjustable socket. The machine is equipped with 1200 ft. film feed-out and take-up hubs.

Write today for full information.

OSCAR F. CARLSON COMPANY

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. . . for more details circle 522, page 81

ERBAN MICROFILM READER

PORTABLE MICROFILM READER Model 910-5

SCREEN SIZE: 9 x 10 inches

ROCKER BASE for adjusting Inclination of Screen

DESK SPACE required: 10 x 10 in.

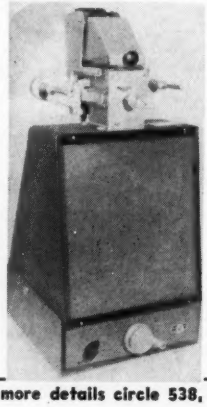
WEIGHT: 11 lbs.

FOR USE WITH:
35 mm Film Rolls,
16 mm Film Rolls
Film Strip: 16 mm, 35 mm, 75 mm Sheet Film, 75 mm

SCANNING
over full width of film by Knob adjacent Crank

IMAGE ROTATION through 360° contin. through SPECIAL PRISM, operated by small thumb wheel

ERBAN PRODUCTS INC.



MAGNIFICATION: 12 x and 18 x change over by small lever

VARIABLE INTENSITY Light Control

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Easy reading, less eyestrain. Simple to operate. Right or left handed controls. Thoroughly reliable instrument of outstanding quality and performance.

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. . . for more details circle 538, page 81

adaptable for photo-offset plates, xerography, or any other reproduction technique where photography is a factor.

Dietzgen will soon be supplying a 105mm flow film camera which puts no limit on microphotography of those endless drawings of assemblies and any kind of roll-length tracing. Acrograph and Micro-Master both point out the acceptability of registration techniques with this large size where series of negatives are printed together in registration.

Summing Up

Don't think I've gone overboard for 105mm as the ultimate answer for all microfilming. As I said earlier, the ultimate use is the key to the process and size. Nothing will beat split 16mm for accounting operations, and do it cheaper. And I have no difficulty using the library reproductions of technical reports on 35mm. But I must confess that I'm impressed as everything with the new field that 105mm has opened up. Incidentally, don't think I've overlooked 70mm. It's been around for a long time and good use has been made of it, is being made of it. In fact many of the 105mm cameras will also take 70mm with no trouble at all. But when I saw the kind of use that the Corps of Engineers is making of 105mm, I became quite excited about it. Then I discovered that a great many industrial firms, telephone companies, pipe line companies, chemical plants, aircraft and shipbuilders, gas and water departments of large cities, were not only making great use of 105mm but were pointing to the economies effected. This may sound contradictory when you at first think that 105mm is a good many times more expensive than smaller microfilm sizes. But you *don't* use 105mm for recording periodicals and office records. You *do* use it for engineering drawings that cost a good deal originally, and are modified, duplicated, rescaled, and revised many times in the course of one large project.

I think it's about time that some of our reproduction experts took a penetrating look into this new and exciting medium. □

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See Readers Inquiry Card . . . Page 81

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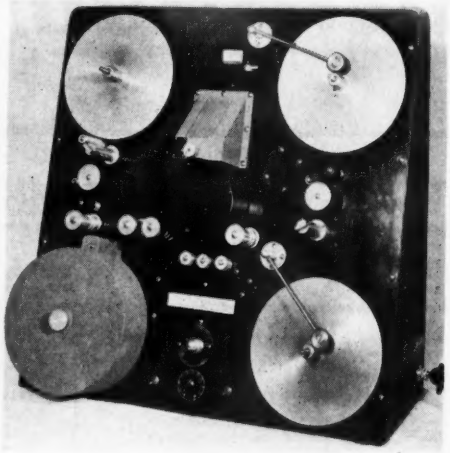
16mm, 35mm and 70mm Dual Light Source

- PD301 VARIABLE SPEED CONTINUOUS ROLL CONTACT PRINTER produces the most EVEN ILLUMINATION coupled to the HIGHEST RESOLUTION possible. Takes Microprint Paper up to Portrait Paper 16 to 70mm wide, slow papers up to high speed microfilm or color.
- To achieve this versatility and quality, a completely new concept of film drive has been developed.
- This drive, from motor to film drive spindle, is completely smooth flowing, without gears or sprockets, and utilizes a constant tension take-up on the positive and negative spindles, regardless whether 1' or 1,000' of film have been rewound.



Specifications

1. FILM SIZE: 16, 35 and 70mm.
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7. POSITIVE FILM MAGAZINE: Light proof, rotary light trap prevents scratches of positive film stock.
8. FILM TAKE UP: Special magnetic clutch film take up with constant tension regardless of film diameter.

PD301 CONTINUOUS ROLL CONTACT PRINTER is available for Microfilm printing of double perforate, single perforate and non-perforate film as a standard unit. It can also be furnished with the following attachments: SPROCKET PRINTING DRUM, LOOP PRINTING ATTACHMENT, LIGHT CHANGE BOARD, AUXILIARY PRINTING TABLE. Special attachments are also available.

PHOTO DEVICES, Inc. **13 Canal St.** **Rochester 8, N. Y.**

. . . for more details circle 592, page 81

Entrance to Iron Mountain Storage Vaults

***Now Available:* The largest storage space for microfilm libraries in the world.**

Special Service Facilities

Recordak Corporation (subsidiary of Eastman Kodak Company) operates a microfilm service laboratory on the premises of Iron Mountain, which is available to all customers.

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Iron Mountain Corporation is associated with Railway Express in providing speedy, high security transportation with delivery guaranteed, directly to Iron Mountain Vaults. The service can be secured by contacting any Railway Express office in the United States.

Get the complete story by writing to —

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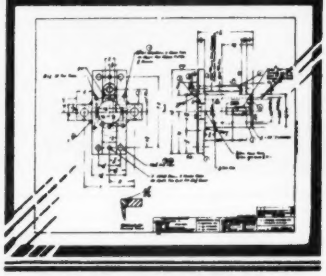
. . . for more details circle 559, page 81

SERTAFILM*

FULL INDEX TAB FOR DRAWING OR DATA CARD NO.



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. . . for more details circle 602, page 81

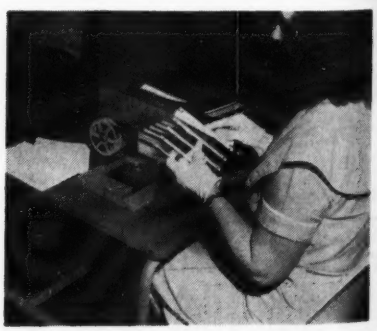
RESEARCH

continued from page 41

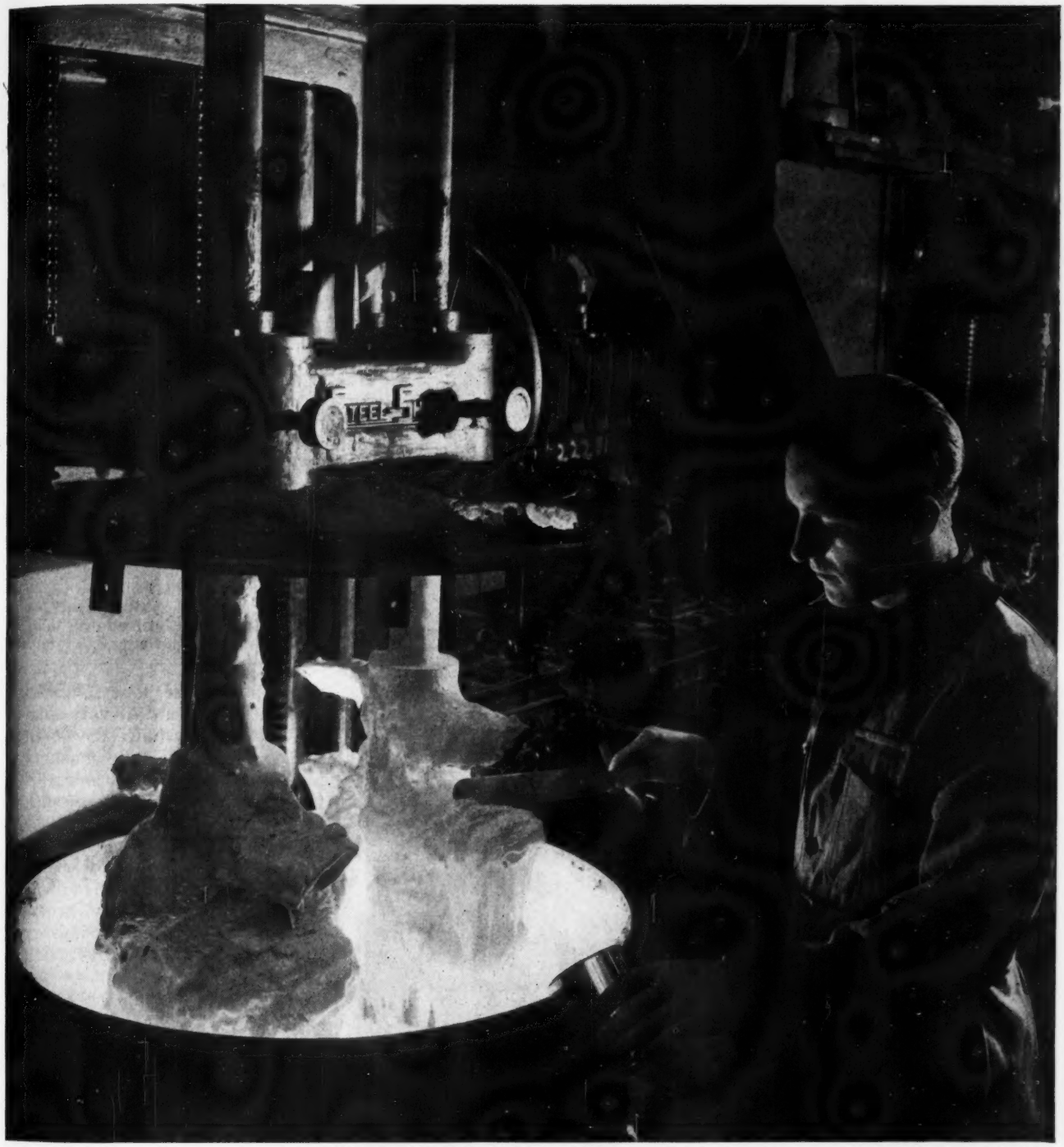
Research microphotography was pretty much a do-it-yourself proposition until the end of World War II. Since that time, the rise in the number of commercial microfilm service agencies has made it possible for all but the largest research libraries to contract their filming out to these companies. Just about all of these service agencies belong to the National Microfilm Association. This organization gives them a chance to meet each other, pool their common knowledge, and attempt to set up standards and ethics for the whole industry.

The 1957 Editorial Index for "Industrial Photography" is now ready for distribution. A few previous year's indexes are also available.

At last year's meeting of N. M. A., in Rochester, one of the hottest items of discussion was "paste-up" micropaper. Microstrip, Microtape and Microtak are all versions of this roll-your-own micropaper. In essence, all of these are ribbon paper prints from negative microfilm. Strips are cut from the ribbon and stuck to cards of any size that fit one's filing system. For very limited editions, or in cases where material needs to be added from time to time, it appears a most useful tool. It is perhaps too early to expect to find much application of this medium in industrial research libraries, but it would appear to have many latent applications in this field. □



Microfilm strips are inserted into special acetate jackets before being filed. Jackets protect against dust and scratching.



"Adhesive Mixer," courtesy of Dunlop Rubber Co. Ltd., photographed by T. C. Grorer on Ilford HPS Plate

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microfilm processing

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Nationwide Service

Write for literature and prices.

Microfilms, Inc.

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. . . for more details circle 587, page 81

MICRO PROGRAM

continued from page 33

cases it is customary to photograph a scale on the drawing so that the scale may be checked when the microfilm positive is displayed, or when a paper enlargement is made. At present it is necessary for a user of 70mm equipment to be quite specific with regard to the tolerances in magnification that are implied by his needs.

Many interesting uses of 70mm film are being found almost daily; one of particular interest is x-rays. Substantially all the detail of a full size x-ray plate of 14x17 inches can be found in a 70mm film frame exposed by the newer cameras. Also available is copying equipment to reduce the large x-ray plate to 70mm and to 35mm microfilm.

Engineering drawings, maps, charts, and clipping files are some of the current applications for 70mm film. Other applications will come into use as the flexibility and the advantages of 70mm film become widely recognized.

105MM MICROFILM AND LARGER SIZES

For engineering drawings and the like of large size such as are frequently in drawings of large aircraft, ships and the like, 70mm film is often too small for convenience and a larger size, 105mm, is coming into use.

One interesting use of the larger sizes of microfilm that is important industrially and will become more important as time passes is the enlargement of such images directly on a sensitized coating applied to sheet aluminum and the like that is to be fabricated into an aircraft skin, for example, which developed image is used for the marking template for the performing of the mechanical operations such as drilling and forming, to be subsequently performed on the sheet metal. In this application as in engineering drawings made to scale, the dimensional accuracy of the enlargement is very important in the manufacturing process, and special pains are taken to assure that the photographic reproduction process does not introduce scale errors or dimensional inaccuracies that might adversely affect the finished product. This process is especially valuable where the number of items to be manufactured is relatively small and where the amount of tooling that is justified is likewise small. It is particularly valuable when mock-ups or performance samples are to be made, as it makes possible a marked reduction in manufacturing time and cost.

INDUSTRIAL PHOTOGRAPHY's 1957 author-subject index is now ready and will be made available without charge to those writing in on their companies' letterhead.

MICROCARDS (OPAQUE MICROPRINTS PRODUCED PHOTOGRAPHICALLY)

Fremont Rider, the promoter of the Microcard, sums up its advantages as follows:

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startling
first
from
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PROFESSIONAL
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This newest, proudest achievement by Ascor heralds a new era in flash photography. Transistor-powering makes possible a lighter, more portable unit, increased power and greater economy of operation.
The new Series 400 assemblies are composed of 100 watt-second, and 200 watt-second power supplies plus a feather-weight light unit. These components can be interchanged with existing Ascorlights, making this equipment extremely versatile and economical.
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American Speedlight Corporation • 63-01 Metropolitan Ave., Middle Village 79, N. Y.

. . . for more details circle 505, page 81

. . . Microcards are a microtext printed on paper, and sensitized photographic paper is much cheaper than sensitized photographic film. . . . On storage they save from 92% to 96% where microfilm saves from 75% to 90%. Finally, because Microcards are provided with a complete and completely standardized catalog entry, they save their purchasers from 80% to 100% on cataloging cost.

But Microcards are also "more responsive" than microfilm in their physical form. Being flat and tough they withstand handling abuse better than reels of film do; being of standard library catalog card size, they are more quickly taken in and out of storage, and more easily inserted in, and taken out of reading machines. Also they are more easily carried in the pocket and sent through the mails.

The reduction ratio commonly used for microcards is about 1:20 and approximately 36 to 48 pages of copy (6x9 or 8½x11) can be placed on a standard microcard. As many as 100 pages can be placed on one card, depending upon the size of the original copy. Thus it is feasible to place a book of average size on eight microcards. If a 15-copy edition (minimum number) were processed, the microcards would cost about 20 cents each. In a 200-copy edition, the cost might be as little as eight cents.

READEX MICROPRINT (OPAQUE MICROTEXT PRODUCED BY OFFSET OR MECHANICAL MEANS)

Microprint is selected when there is a basic demand for at least 50 copies of the original record. Cost per card then averages approximately 20 cents. The Readex Microprint Corp. states that among the advantages of Readex Microprint are:

First, it is economical in cost. Since it is printed and not merely another method of photographic reproduction, its cost is approximately one half that of microfilm, and from one-third to one-fifth that of other forms of microreproduction.

Second, each 6x9 Microprint card contains 100 pages of the original text. . . .

Third, it is permanent in use as well as storage since the Microprint image is formed by ink on paper and is protected in use by a glass covered tray.

Fourth, . . . cards are stiff enough to handle with ease . . . Each card has a caption which can be read with the naked eye.

MICROLEX (OPAQUE MICROTEXT PRODUCED BY PHOTOGRAPHIC MEANS)

Microlex may be selected when the edition to be published runs from 100 to several thousand. A 400-page book is recorded on two faces of a single card 6½x8½ inches; a 100-volume set of books is shelved in the space needed for only four of the original volumes.

According to the Microlex Corp., the material to be reproduced is photographed page by page by a step-and-repeat camera on negative sheet film 6½x8½ inches; the horizontal dimension of the page runs the long way of the negative and card. From each such negative photographic prints are made in the number required. The prints are then laminated back to back, so that the final product is a series of 6½x8½-inch cards each containing 200 pages per card side, with the necessary identification such as volume numbers and page range printed in large readable type at the head of each card. □

WHAT IS THE NATIONAL MICROFILM ASSOCIATION?

The Seventh Annual Convention of the National Microfilm Association will be held this year in New Orleans, April 21-23. Details on the three-day session are available on page 29 of this issue. A brief outline of the goals and history of the NMA is presented here by Vernon D. Tate, executive secretary of the group.

The aims and objectives of the Association are clearly stated in Article II of the Constitution. "... to promote the lawful interests of the microreproduction industry in the direction of good business ethics; the liberal discussion of subjects pertaining to the industry; technological improvements and research; standardization; the methods of manufacturing and marketing; the education of the consumer in the use of microfilm and related techniques."

The above was written in 1943 when a group of men met in Cleveland to consider the future of a technique in which they were deeply interested—often for completely different reasons. They formed the NMA, a medium whereby microfilm users can get together with equipment manufacturers and service companies.

Among the Association's most important achievements is its annual meeting at which members get together to work out mutual problems. Since not every member can attend, the NMA publishes "Proceedings," a documented record of the more formal parts of the convention. A monthly publication, "Micro-News," keeps members up to date on industry developments during the year.

By facilitating discussion, research and education on matters of pertinence to the microfilm industry, the NMA promotes and advances the interests of the industry and those who participate in any phase of its operation.

MOVIE CLINIC:

Technicians on Techniques

HINTS ON STORING RAW ACETATE MOVIE FILM

Sensitized acetate motion picture film is perishable. It needs to be stored remote from such gases as hydrogen sulphide, ammonia, formaldehyde, sulphur dioxide and illuminating gas; from motor exhausts; from the vapors of cleaners, solvents, mercury and turpentine; and from x-rays, radium and other radioactive materials. The moisture and heat of its environment must conform to certain standards to insure it against damage from the excessive presence of either. As in the case of organic substances like fruits and vegetables, deterioration resulting from unfavorable storage conditions at any time in the life of film may be arrested but can never be removed by subsequent favorable storage.

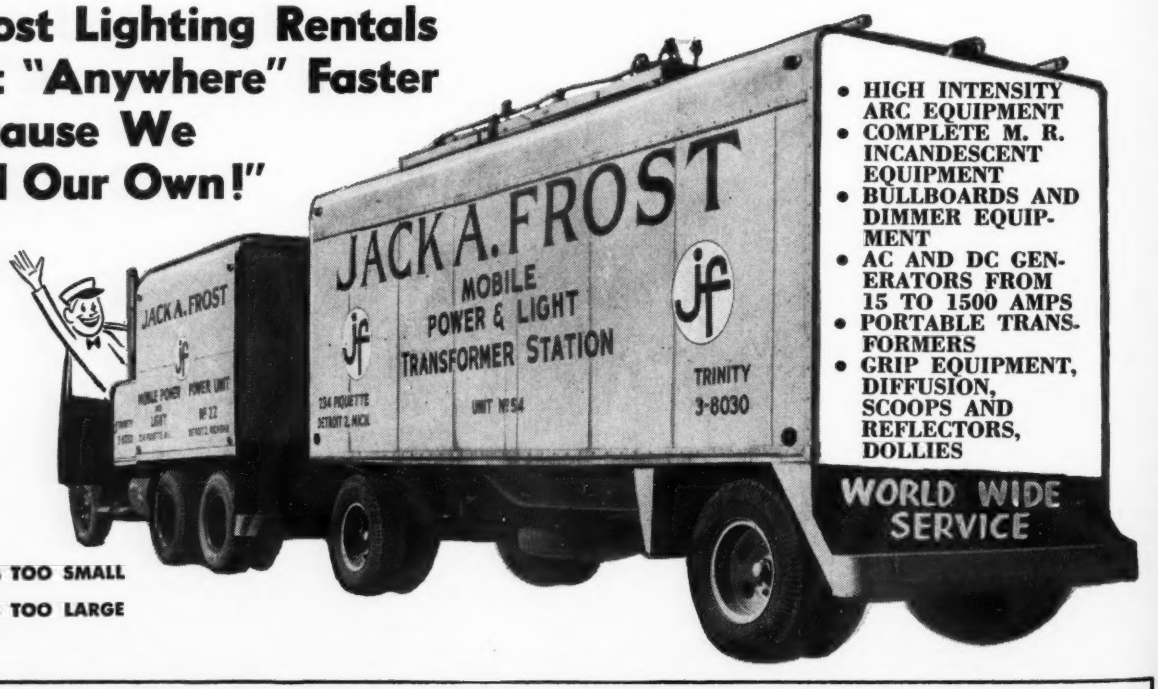
The sealed can in which raw stock generally comes is its first line of defense against most harmful elements, but must receive an assist from the room in which it is stored.

To begin with the room picked for storage should not be in danger of accidental flooding by storms, water pipes or sewers. If it is artificially cooled, it should be built so that moisture does not condense on its walls. The shelf arrangement should be such that the lowest shelf on which film will be stored is at least six inches off the floor.

If the storage area houses unsealed stock, the area should be conditioned at 50 to 60 per cent relative humidity. Even sealed stock should not be subjected to excessive high relative humidities because of possible damage to labels and cartons from moisture and mold and to cans from rust.

In general, the lower the storage area temperature the better film keeps. Temperatures below 50 degrees F. are seldom necessary where storage times are usually a matter of only a few months. If stock must be kept longer than six months, it should be kept at a temperature of approximately zero degrees F. Where quantity permits, deep-freeze units are ideal for this purpose. Even at zero degrees, deterioration may continue — slowly it is true—but continue nevertheless, so it is better to replenish stocks regularly than to overstock and risk wastage.

"Frost Lighting Rentals Get "Anywhere" Faster Because We Roll Our Own!"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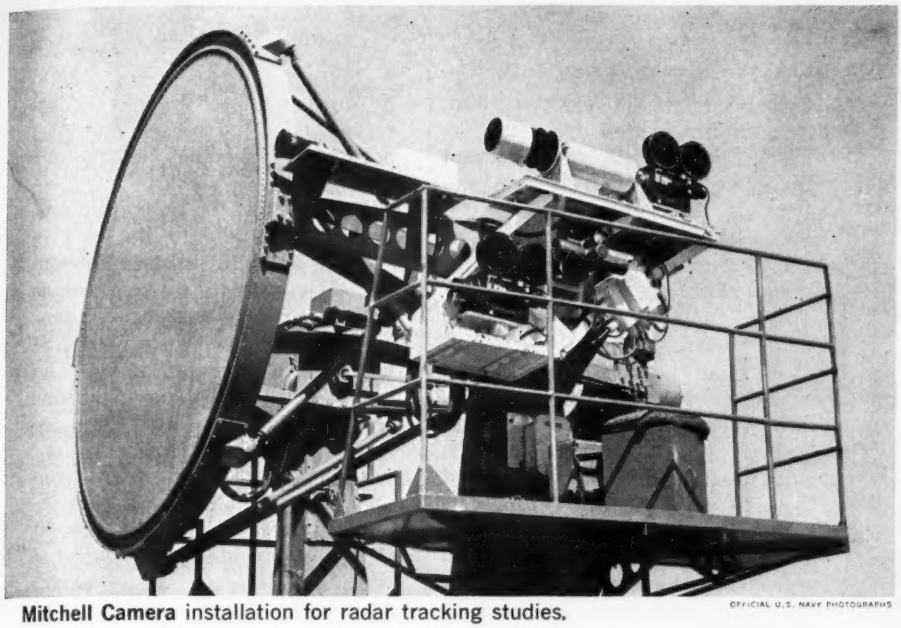
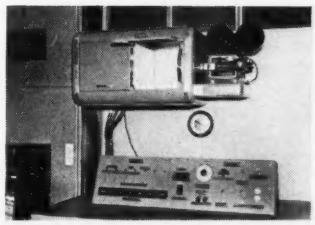


Mitchell Camera installation for radar tracking studies.

OFFICIAL U.S. NAVY PHOTOGRAPHS

HOW MITCHELL CAMERAS SUPPLY VARIED DATA IN ROCKETS AND MISSILES DEVELOPMENT

- Exact Pin Registration During Film Exposure
- Event Time to 1 Millisecond



Data dial instrumentation by Mitchell camera.

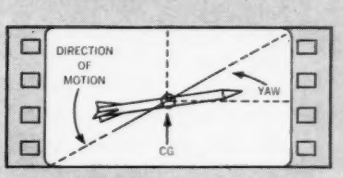
Extensive testing instruments incorporating Mitchell 16mm, 35mm and 70mm cameras provide key data at the U.S. Naval Ordnance Test Station at China Lake, Calif., one of the primary weapon development centers of the Navy's Bureau of Ordnance.

Fifty Mitchell 35mm cameras are used on radars, tracking camera mounts and fixed tripods to record missile and rocket development. Camera motors allow synchronous as well as in-phase operation of several cameras covering a test...important in film assessing. Eight 16mm Mitchell cameras are used for pictorial coverage of tests.

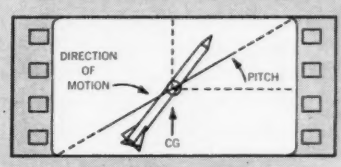
One metric photographic group shoots as much as 20,000 feet of 35mm film in one day. Other Mitchell cameras record underwater, engineering and aviation tests at this ordnance center.

For information on Mitchell cameras, write describing your requirements.

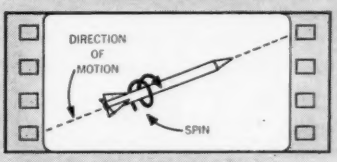
The Mitchell camera, by virtue of its exact pin registration during film exposure, allows these data to be determined to a reasonably high degree of accuracy through the use of film assessing equipment built to take advantage of this feature:



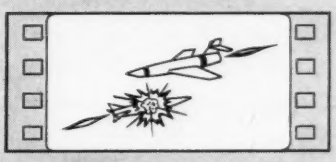
Yaw—Side-to-side motion of missile.



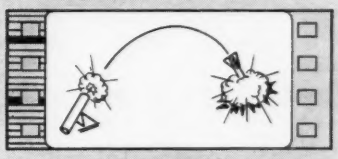
Pitch—Up-and-down motion of missile.



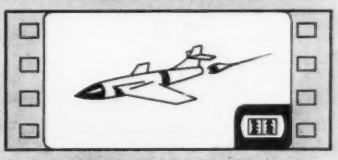
Roll—Turning motion of missile.



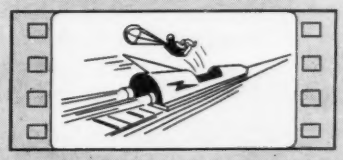
Miss Distance—Gap between missile and target at point of interception.



Flight Time—A series of lines on film; timed to accuracy of 1 millisecond.



Position Data—Target location with azimuth and elevation readings.



Pictorial Record—Record of all visible actions during test.

Separation Data—High-speed separation actions for detailed study.

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. . . for more details circle 578, page 81

MOVIE CLINIC

continued from page 60

Low storage temperatures are particularly necessary for high-speed black-and-white negative films and for color film. The loss of speed suffered by high-speed negative films through high storage temperatures cannot always be compensated for by increased exposure. As for color film, unfavorable storage temperatures may cause one color-sensitive layer to deteriorate at a different rate than the other layers, causing a change in balance and speed. Of course, carefully controlling the general temperature of the storage area will mean nothing if cans of film are placed directly in sunlight or near heating pipes.

Photographic film is not harmed by temperatures below the freezing point of water because its water content is relatively small. However, to prevent damaging moisture condensation from occurring on sensitized film, cans of film which are refrigerated should be allowed to warm up above the dew-point temperature of the outside air before being opened. For the warming-up period, cartons containing more than one can should be opened and the cans removed and separated.

Because poor storage conditions generally cause more serious damage to exposed but unprocessed film than to unexposed, film should be processed soon after exposure. This is not always possible when shooting takes place at a location far removed from normal laboratory facilities, although air transport has ameliorated that problem somewhat.

AVOID MOISTURE

When on location in an area with high relative humidities, it is easier to avoid excessive moisture take-up on film than it is to remove the excess moisture once it has been absorbed. Drying film by means of desiccants is involved, time-consuming and does not always produce satisfactory results.

Under excessively humid conditions, film should be kept in its original sealed tin as close to the time it is to be exposed as possible. Magazines which have to be loaded well in advance of use should be kept in an air-tight metal box from the time they are loaded until they are needed for camera exposure.

Normally, the moisture content of a film roll will not increase much during the time it is being exposed. However, if there are long delays in shooting, or if a roll of film loaded for use in the camera one day is held over to the next, the magazine should be removed and placed in a dry vapor-tight container. Immediately after exposure, film should be re-sealed in its can.

Household refrigerators are ideal storage boxes for sealed raw stock when on location in tropical areas. If refrigerators

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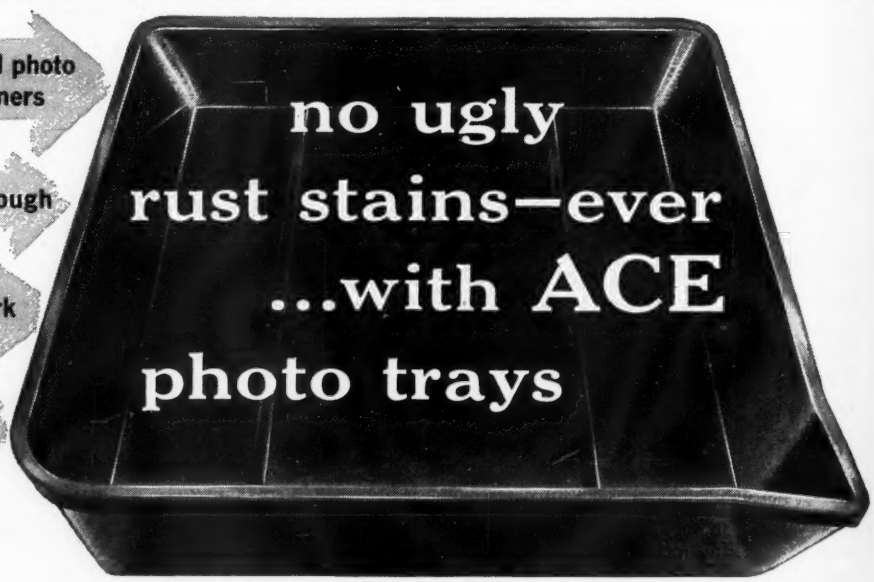

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. . . for more details circle 504, page 81

are not available, the basement of a building should be used. Film should never be stored in such hot spots as the top floor of uninsulated buildings or sheds with metal roofs.

COLD STORAGE

Just as refrigerators are ideal for storing film, refrigerated trucks are ideal for transporting it. If another type of vehicle must be used, film can be protected from the heat by packing it in insulated containers with dry ice and keeping it away from the top or sides of the vehicle. Temperatures at those points can soar to 140 degrees F. or even higher. When the carrier is parked it should be under shade.

By observing the precautions noted here, film will retain its optimum properties. □

WIND-TUNNEL

continued from page 21

with black and white film, much valuable time and expense was saved during the experiments.

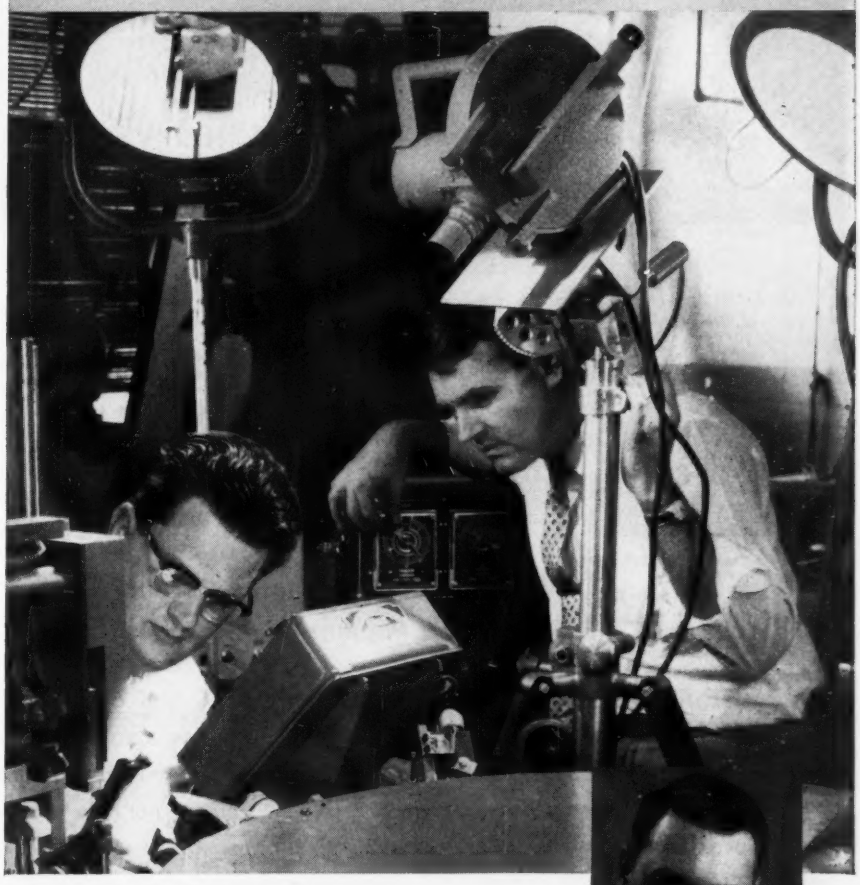
Using Super XX film he was able to stop the camera down to *f*/8 at 1/100. Development was in DK60A for eight minutes at 70°F.

With this system, two separate (before-and-after) exposures are made. A duplicate positive is then made of each one, by contact printing, onto high contrast Kodalith Ortho, which is developed in Dektol 1:2 for one minute. The positive is then projected with an Omego DII enlarger onto Kodak matrix film and processed normally as with Dye Transfers.

The two matrixes are dyed—one cyan, the other magenta—dried, registered, punched in registration and a composite print made through the normal Dye Transfer procedure on Kodak Dye Transfer paper or regular enlarging paper that has been fixed without exposure and washed thoroughly.

The end result is a clear white print with one set of red and one set of blue lines with no confusion resulting from their crossing. □

Automatic connecting rod assembly machine manufactured by Gilman Engineering. Stations on machine must index accurately and rapidly and be completely free of bounce, vibration and inertial deflection. High speed photography provides the only effective means of assuring that the machine is indexing accurately.



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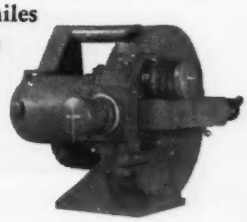

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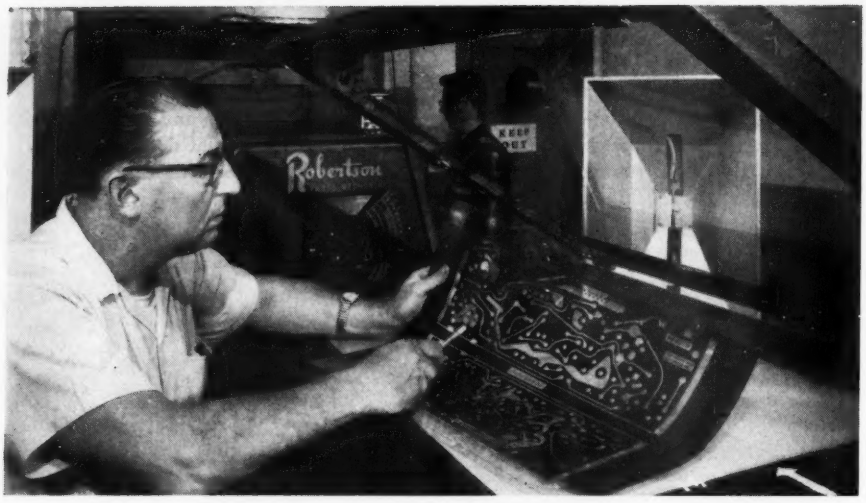

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NEW EQUIPMENT

continued from page 15

ment users to make right-reading photocopies in one shot, positive or negative, either black on white or white on black. In the one-step process copy can be enlarged up to four times or reduced to half-size. The prismatic head, from *Kenro Graphics, Inc.*, measures 21" x 15¾" at the base and 15" in height.

It is equipped with a folding pressure back to facilitate easy positioning of the photosensitive material.

Kodak Retina Reflex Camera 110

Eastman Kodak joins the field of fully automatic single-lens reflex cameras of the pentaprism type with the introduction of the Kodak Retina Reflex. The camera offers focusing accuracy through either a full-area ground glass or an optically-coupled split-image viewfinder combined with the rangefinder. Features include a 50mm *f*/2 Retina Xenon-C lens, built-in photoelectric exposure meter, synchro-compur shutter, single-stroke rapid film advance and built-in self timer. Price: $215.

Micro-Film Jacket 111

A new type of Micro-film jacket, using an advanced sealing technique, has been developed by *Vita-Loid, Inc.* Instead of cementing plastic rib separators between two pieces of acetate, the acetate is fused to itself to make a jacket said to be immune to normal deterioration and warpage caused by the aging and drying of the cement binder. Not restricted to parallel rib separations, the jacket can contain any number of compartments on a sheet. Transparent and lightweight, the jacket measures 3⅜" high x 4⅞" deep.

Stop Motion Motor 112

A new 110 volt AC synchronous stop motion motor for the Maurer camera has been introduced by *Camera Equipment Co.* It is easily attached to the Maurer with no special tools required. Included on the motor are a control box and counter. Other features are: DC braking, forward and reverse switches, continuous operation switches and a hand control switch for single-frame operation.

Super Hypan Film 113

Ansco's new Super Hypan film,

continued on page 67

Association News

MITCHELL BADLER, Associate Editor

Schedule Conference

The *American Society of Magazine Photographers* and the University of Miami are co-sponsoring a Photojournalism Conference. To be held on the university's campus in Coral Gables, Fla., May 7-10, it is the second such conference jointly sponsored by ASMP and the university. Co-chairmen are Morris Gordon, educational director of ASMP, and Wilson Hicks, Miami's supervisor of student publications. The conference program and registration blanks are available from Mr. Hicks, P.O. Box 8107, University of Miami Branch, Coral Gables 46, Fla.

Photo Technology Course

A recent meeting of the training committee of the *National Association of Photographic Manufacturers* reviewed the success of the NAP-sponsored course in photographic equipment technology at the Long Island Agricultural and Technical Institute. Successful performance of the first graduates of the course, June 1957, has led to plans for increased enrollment.

Discuss Aerial Reconnaissance

Aerial reconnaissance was the subject of discussion at a recent Los Angeles meeting of the *Society of Photographic Instrumentation Engineers*. Featured speaker was Tom Leighton, project engineer for the Hycon Manufacturing Co. He emphasized that factors beyond the scope of photography are useful and necessary in obtaining required information from the air.

Film Processor Discussed

John H. Waddell of Fairchild Camera was the featured speaker at a recent meeting of the *Society of Photographic Scientists and Engineers*, New York Chapter. He demonstrated and explained the recently introduced Fairchild Mini-Rapid 16mm Film Processor, which is capable of processing film at rates up to six feet per minute, delivering a 100-foot roll of film dry and ready for projection in less than 17 minutes.

National Microfilm Association

The Annual Meeting and Convention of the *National Microfilm Association* will feature a program of papers on the newest developments in the field, exhibits of equipment and supplies, and the Annual Award of Merit. Set for April 21-23, the meeting will be held at the Hotel Monteleone, New Orleans, La. Information and registration materials are available from the Executive Secretary, National Microfilm Association, P.O. Box 386, Annapolis, Maryland. □

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Related Reading

The Nikon Manual of 35mm Photography

by George B. Wright, Universal Photo Books, New York, 288 pp., $5.95.

Although to this reviewer the Leica Manual has always seemed the classic volume in the field of 35mm photography, George Wright, an editor-photographer-writer, has produced a comprehensive and impressive book which may stand with pride alongside the old-time favorite.

When an author produces a book devoted to the use of a specific camera, it is too often a service manual for that particular piece of equipment. Wright's book, although written in great detail about the Nikon, can well serve as good and recommended reading to any 35mm camera user, regardless of brand, trade name, or camera-nationality.

Well illustrated with diagrams and charts, the book makes for good reading and study, even for the experienced 35mm man. The sections on developer action, densitometry, and choosing a developer are well organized. Latest techniques are included and commented upon. Latest, that is, up to press time, for any volume on photography today must be open ended. No matter what the publication date, it will NOT be all-inclusive for long.

Depth of field scales for ALL Nikon lenses, formulas for developers, reducers, etc., make up a most valuable appendix which also includes such data as comparison charts of various color films, filters, flash factors and other pertinent data.

This is a recommended book for any 35mm camera user; it is essential for every Nikon owner.

—DBEjr

Printing and Promotion Handbook

by Daniel Melcher and Nancy Larrick, McGraw-Hill Books, New York, 1957, 438 pp., $7.00.

This revised edition of a standard reference work was designed to aid advertising and promotional personnel by providing where-to-get-it, where-to-buy-it and how-to-do-it information on every type of printing service and product. It follows the design admirably and particularly well in those sections dealing with photographs and photographic reproductions. The book describes reproduction processes, criteria for photo selections and discusses photography as a printing process—all in clear, non-technical language. Especially useful are charts to help choose the right printing process for the right job. The Handbook is written in encyclopaedic format with alphabetical entries and includes a type specimen book and postal guide among its valuable indices. —M.M.B.

Photographs Of The Year 1958

Philosophical Library, New York, 32 pages text, 104 plates in color and black and white, $6.95.

The 1958 version of this classic perennial of classical photography is similar to many of the others in the series during the past sixty some years — pictorial photography selections from the work of photographers from many lands. □

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NEW EQUIPMENT

continued from page 57

with regular exposure indices of 400 and 500 for tungsten and daylight, respectively, can be force-developed to speeds of 1000 and higher. A wide exposure latitude allows over and under exposure of up to two stops. Its grain is said to be finer than that of ordinary high-speed films and fog level low. Normal processing is advised for most electronic flash exposures. Super Hypan is available in all sheet film sizes from 2¼ x 3¼" to 11 x 14" and in 120, 620 roll and 35mm sizes.

Photographic Lamp 114

Sun Ray Photo Company's No. 32 lamp, which can be used with a No. 4 photoflood or a 1000 Watt bulb, offers a special bulb centering feature said to permit maximum brilliance. Cast in heavy gauge aluminum, the lamp measures 13" in diameter and 6" deep. It is equipped with a universal arm, mogul socket, heavy duty switch, 15' of cord and optional side shields. Lamp interior is satin finish; exterior is baked black wrinkle finish. Price: $25.00.

Universal Model "C" Cutter 115

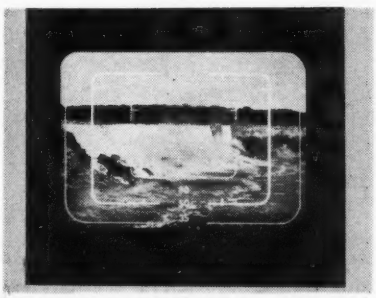
Laukhuff - Pratt Manufacturing Corporation's Model "C" cutter is made in five sizes to fit specific needs. Sizes are 16", 20", 24", 30" and 36". The cutter consists of a rigid steel frame, square steel base and ground steel self-honing blades. Spring tensioner exerting even pressure against the entire length of the blade is said to insure clean cuts. Accessories available include a safety latch, table gauge, floor stand with casters and parallel clamp and foot operator. Shipping weight varies from 30 lbs. for 16" model to 165 lbs. for 36" model. Price: from $102 to $240.

Contaflex Alpha and Beta 116

Two new additions to the Contaflex line of Zeiss-Ikon single-lens reflex cameras have been announced by *Carl Zeiss, Inc.* The Contaflex alpha is fitted with a convertible Pantar *f*/2.8 45mm lens in a Prontor reflex shutter with self-timer and speeds to 1/300 of a second. The Contaflex beta has, in addition, a built-in photo electric exposure meter. Both cameras retain standard Contaflex features such as removable back, through-the-lens focusing, etc. Price: alpha, $126.00; beta, $149.00.

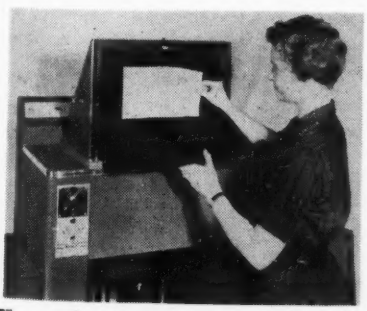
Microfilm Processor 117

An automatic processing machine for microfilm is announced by the *Houston Fearless Corp.* Model 22-BC will accommodate both 16mm and 35mm film, operate in daylight and incorporate an archival wash for film permanency. Processing speed is variable up to 20' per minute. Semi-portable, the machine is almost entirely made of stainless steel and mounted on casters. Dry box has heat lamps and air filter.

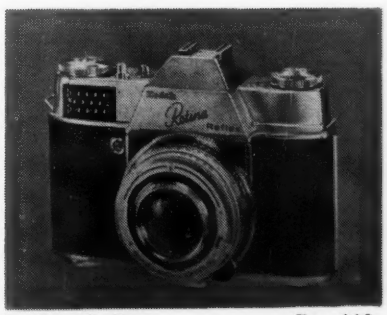


Retina Rangefinder See 107

Microfilm Readers See 108



Kenro Accessory See 109



Retina Reflex See 110

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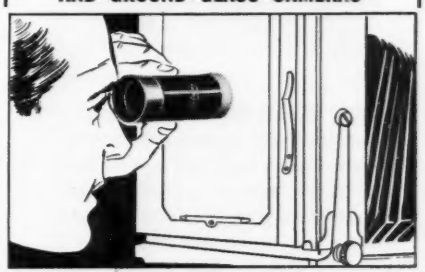

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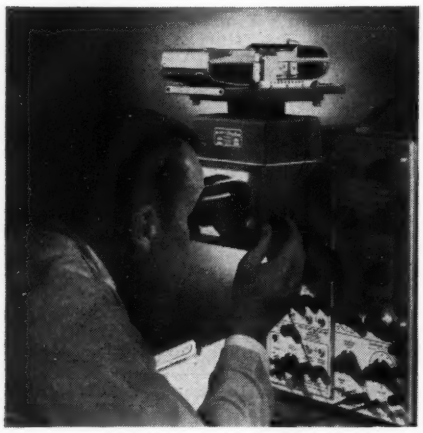


LABORATORY recording of oscilloscope traces is far more efficient with this new camera.

Key to the versatility of the new Beattie Oscillotron with a polaroid back is the feather-touch Multiple Exposure Positioning Bar. Now you can get one-to-one presentation or up to 10 exposures on a single frame—by a simple adjustment. Other features: f/1.9 lens, shutter speeds from 1 sec. to 1/100 sec., time, and bulb.

This new Oscillotron camera fits the same periscope to which all other Beattie Oscillotron cameras are attached.

Multiple Exposure Positioning Bar

for more information write to

BEATTIE-COLEMAN inc.

1000 N. Olive St., Anaheim, California

. . . for more details circle 511, page 81

Safety Precision Trimmers 118

The Nikor Safety Precision trimmer, for exact cutting of film strips, is available from *Burleigh Brooks Inc.* Employing double cutters for 22″ long strips of film to a width tolerance of plus-or-minus .005″, the special trimmer is furnished with vacuum pumps that hold the film flat during cutting.

Match-Matic C3 119

Standard Argus C3 features have been combined with a simplified exposure-finding system in *Argus Cameras'* new Match-Matic C3. In place of traditional lens and shutter adjustments, the photographer merely sets the camera's shutter dial for "scenes" or "action" and adjusts its light meter to a matching number. The meter then automatically designates the correct lens opening. The 35mm camera has a 50mm Argus *f*/3.5 color-corrected lens, a shutter speed range from 1/10 to 1/300 and a behind-the-lens shutter that permits easy removal of the lens. Price: $74.95.

500-Watt Slide Projector 120

A slide projector designed to furnish brilliance in large rooms has been announced by *Eastman Kodak*, the Kodak 500. Light for the picture comes from a Westinghouse 500-watt lamp with "Focus-Lok" base. For continuous cool operation, the condenser optics include a special separate heat absorbing glass. The projector can screen 35mm, Bantam or 38mm slides and is available with the Kodak Readymatic Changer or an automatic magazine changer. Standard lens is a four-inch *f*/3.5 Ektanon. Price, with automatic changer: $84.50.

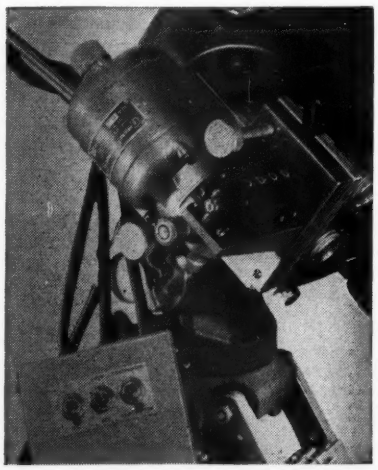
Frezzo-Lite Model "500" 121

A newsreel light that will deliver a minimum of 24 minutes of high intensity light is available from *General Research Laboratory*. The unit is adaptable for motion picture location work and gives illumination balanced to 3400° K for either black and white or color film. A nickel cadmium battery weighing 15 pounds that recharges its power pack automatically in approximately two hours is the heart of the unit. Dimensions of battery unit are 9″ high, 8¾″ wide and 2¾″ deep. Price: $358.00.

High Speed 16mm Lenses 122

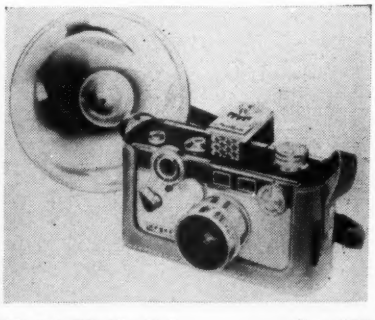
Increased uses of available light movies are possible with the intro-

continued on page 74

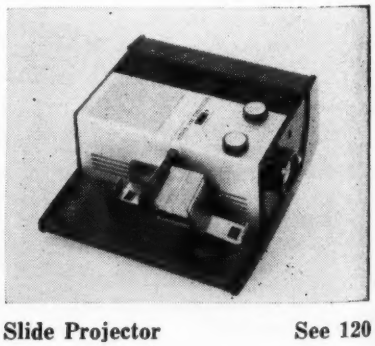


Stop Motion Motor **See 112**

Sun Ray No. 32 Lamp **See 114**



Match-Matic C-3 **See 119**



Slide Projector **See 120**

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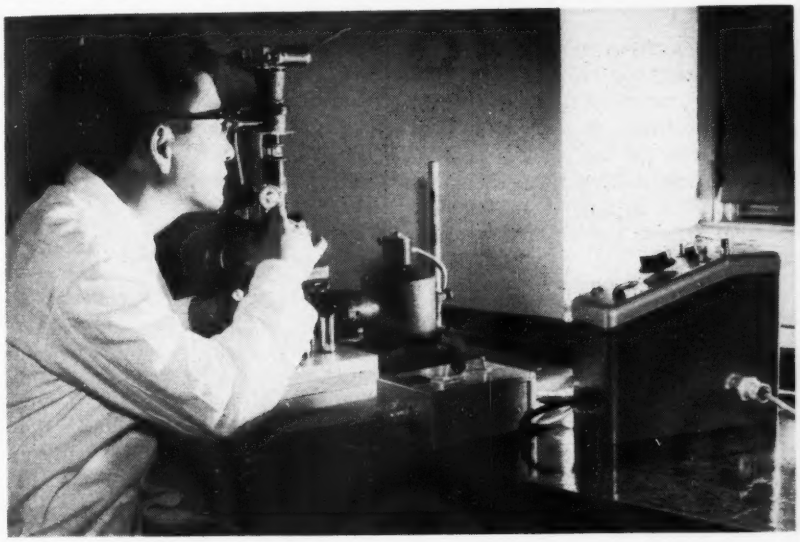

Dr. Ito uses electronic flash and a phase contrast microscope to photograph living tissues at exposures of 1/1500 of a second.

by CHARLES H. COLES

Electronic flash is finding new worlds to conquer—the world of living things under the microscope. Although biological specimens have been photographed for many years, the standard microscope techniques required that the tissue be preserved, cut into thin slices, and then stained with dye. In this way the various structures would stand out by virtue of varying dye affinity. Bright illumination would not harm the lifeless tissues during the relatively long exposure needed.

However, to observe living tissues, staining is not very effective. Vital dyes may be used to stain certain cell structures but the dyes must be used in low concentrations with the result that the finer structures do not attain sufficient contrast for effective photography. To make matters even more complicated, the extremely minute membranes which were of particular interest were at the limit of the resolving power of an optical microscope. It was these membranes found within living guinea pig spermatids that Dr. Susumu Ito of Cornell University Medical College in New York tried unsuc-

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. . . for more details circle 586, page 81

cessfully to photograph with standard equipment.

The modern means of increasing the visual contrast of living cells is by the use of the phase contrast microscope. This method employs a microscope equipped with a complex internal optical system arranged in such a manner that minute differences in the refraction index within the specimen appear as varying densities of light. To increase definition a Wratten green filter (No. 58) is placed in the light path below the microscope condenser.

With illumination provided by a standard 6-volt, 100-watt microscope lamp, the phase contrast microscope could just resolve the membranes under study at a magnification of 1250. Actually these membranes have a thickness below the theoretical resolving power of the light microscope, but they can be seen because the microscope lens system has some depth of field and the membranes offer a curved surface when viewed at the edge. These membranes can only be seen in profile; they are not detectable in the living cell when observed lying in a direction parallel to the plane surface of the slide.

These membranes are usually found in a surrounding fluid and are in a continuous shimmering motion. Perhaps it is due to thermal agitation in a fluid or the result of Brownian movement, but the fact remains that time exposures are out of the question, and yet there is not enough light by available microscope light sources for an exposure short enough to stop the motion. The most intense illumination by a carbon arc or a zirconium point source permitted exposures as short as 1/25th second, but this was far too long to freeze the action of the membranes.

PROBLEM SOLVED

Electronic flash was successfully employed to solve this problem. The equipment consisted of an Ascorlight B 501 Power Supply (200 watt-second capacity), an Ascor L 425 Light Unit with F 517 Flash Tube; and for viewing, an Ascor M 403 continuous Light Adapter. The flash lamp was fitted into a small lamphouse set up alongside the microscope. Between the substage mirror and the flash lamp is a two-inch diameter T-shaped tube, the light from the flash passing through the straight part of the T. The arm of the T-tube is pointed toward the 6-volt focusing lamp. Inside the junction of the T-tube a front surfaced mirror was hinged which could be turned to direct either light source into the microscope. A water cell

continued on page 83

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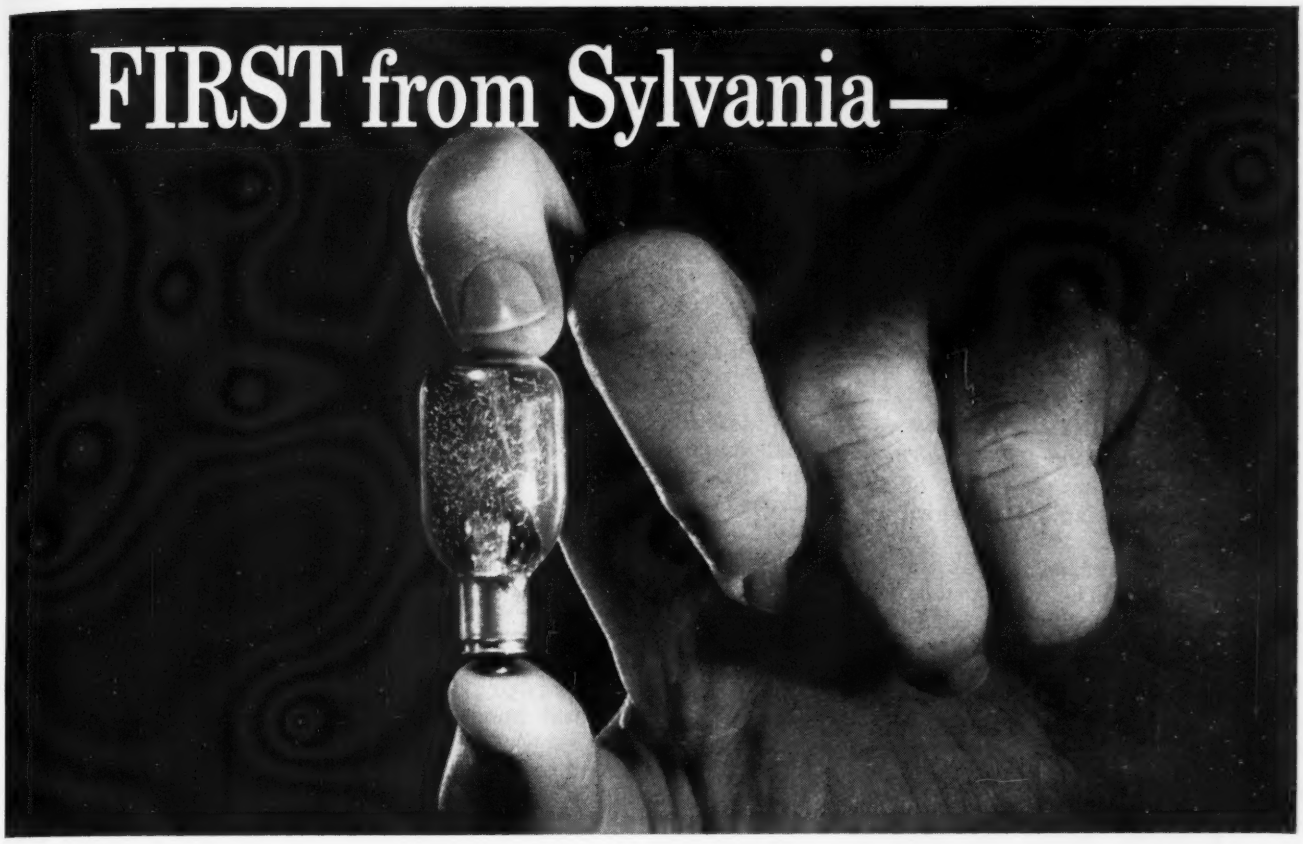

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Sylvania's new Zirconium-filled M-5 and M-25 flashbulbs pack the light power of bulbs 4 times larger!

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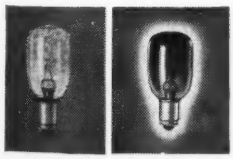

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Approx. Peak Lumens	1,200,000	600,000
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. . . for more details circle 605, page 81

Technical Trends

by GEORGE ASHTON

NYLON PRINTING PLATES

In the *American Photoengraver* details are given of the nylon printing plates which are being developed and tested in the Springdale laboratories of Time Inc. The nylon plates have been given extensive laboratory evaluation and up to 300,000 impressions at speeds as fast as 2,000 feet per minute have been printed without noticeable wear.

To render the plate sensitive to light, a sensitizer is added to the viscous solution of nylon in a heated mixing vat, and the mixture then cast, granulated and vacuum-dried to form a photosensitive molding powder. The sensitivity is in the ultraviolet around 360 mμ. The powder is then molded in the form of a sheet and laminated to a pre-curved aluminum shell. Tests indicate that the pre-sensitized plate has a storage life in excess of six months.

The plate is exposed through a conventional line or screen negative to General Electric UA 11 mercury vapor lamps. The total exposure time is six minutes with the plate revolving past the lamps.

The developing step, replacing both developing and etching of normal engraving practice, is performed by machine splashing an alcoholic solution against the plate surface; this removes the soluble portions of the plate not hardened by exposure.

Production tests of the new plate are said to be under way at the present time. From this preliminary information, the nylon printing plate looks like a development of major importance

TEMPERATURE-CONTROLLED CLOCKS

Starting out in photography most people quickly catch on to the idea that if the developer is cold you need a longer developing time to get the same negative contrast and vice versa. Most film manufacturers provide detailed information in the form of graphs and charts to enable the users to compensate for developer temperature variations and, by and large, things seem to have gone along pretty smoothly for the past hundred years or so.

Now two Eastman Kodak scientists, Donald J. Howe and J. A. C. Yule, have come up with another approach to the problem of controlling this variable, in the form of a temperature-dependent clock. The time control unit works on the same principle as a normal electric clock which keeps accurate time so long as the mains frequency is held at 60 cycles per second. If the mains frequency becomes higher the clock gains, and if the frequency becomes lower it loses time.

The new Kodak unit uses the temperature of the developer to control the frequency of the alternating current supplied to the clock. This is done electronically with circuits containing a thermistor. The clock runs either fast or slow depending on the temperature of the developer. Thus the clock indicates the normal processing time, which might be two minutes at 68 degrees F., but if the room temperature should rise then the actual elapsed time might be only one minute 50 seconds. It is said that the temperature compensating device can be calibrated to follow the time-temperature relationship for practically any developer-film combination within a plus-or-minus four degrees F. range. It is reported the Eastman scientists claim that it has proved possible, by use of this clock, to increase the accuracy with which some photographic materials can be processed by as much as 20 times.

THE PERFORMANCE OF LENSES

Many a photographer must have wished that the performance of lenses could be evaluated in a foolproof way so that they could be compared easily and directly. *Photo-Technik und Wirtschaft*, a technical and scientific photographic magazine published in the West Zone of Berlin, reports that one of the committee of the German Standards Association is working on this problem.

A statement from the committee outlines the difficulties of providing the essential information on the performance of a lens in a single figure or even a group of figures. Much depends on the conditions under which the measurements are made and figures for resolving power taken by viewing the aerial image with a microscope will be much higher than can be obtained with even the finest grain emulsion.

As well as resolving power the contrast with which fine detail is reproduced is also important. Other factors which would have to be taken into account in characterizing the performance of lenses are the size of the circle of confusion, the size of the field, the maximum aperture, the reproduction of detail off-axis, vignetting, transmission and the spectral absorption.

The statement concludes that even if it were possible to provide information on all these factors in an easily understood form, it would not be possible to do more than group lenses into classes. It seems as though the sort of pictures a lens will produce is still the best guide to its performance.

NEW GERMAN STANDARD SPEED RATING SYSTEM

A brief item in the German publication *Photo Magazin* for January 1958 reports that in a

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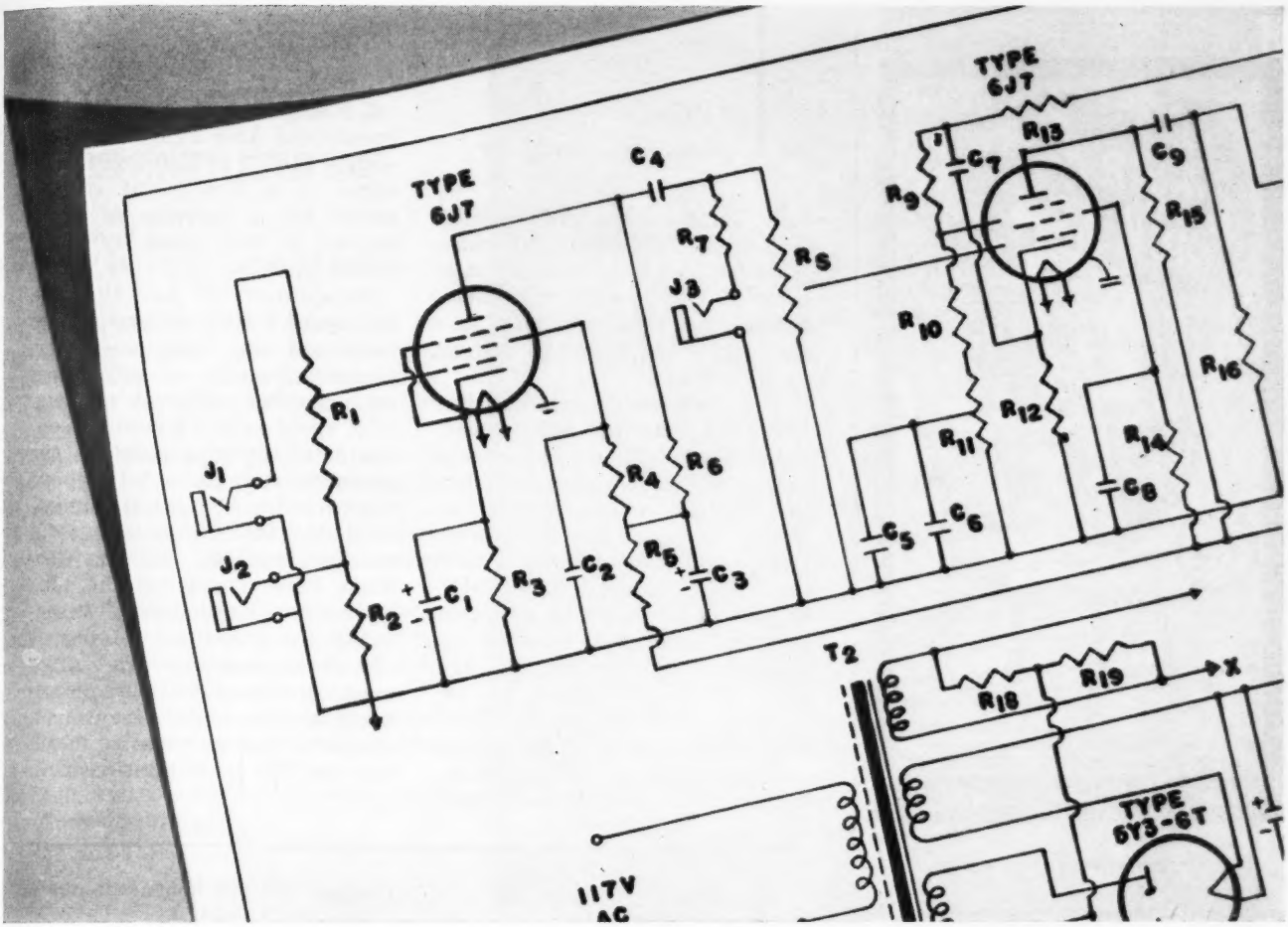

Three users tell why **Cronaflex** TRADEMARK is superior

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Beech Aircraft Corporation, Wichita, Kansas, has found that CRONAFLEX films withstand rough handling and are easy to store. Furthermore, their sharp black-line copies on CRONAFLEX are decidedly better than the gray pencil originals.

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Fisher Governor Company, Marshalltown, Iowa: "We used to have to be very careful with our cloth intermediates because of their fragility and the shrinkage we encountered. When we switched from cloth to CRONAFLEX, with its toughness, stability and easy handling characteristics, we were able to introduce many improved methods in our reproduction work. These methods, made possible by CRONAFLEX, have increased quality and reduced costs."

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TRENDS

continued from page 72

new German Standard Specification, the DIN film speed classification has been brought into closer line with ASA recommendations and that it is now possible to convert from one system to the other.

The lack of correlation between the American and German speed rating systems has been a source of considerable irritation to practical photographers in Europe for some years. The new recommendation provides a welcome relief. In the future a DIN speed will be shown as a simple two figure number followed by a degree sign: for example, 21° DIN which corresponds to an ASA speed of 100, or 24° DIN which corresponds to 200 ASA.

This logarithmic system of indicating film speed is much used in Europe (although Weston speeds and ASA figures are also widely used). A doubling in the speed of a film is, of course, shown by an increase of 3°, a halving of film speed by a decrease of 3°.

In spite of the fact that the two speed rating systems can be converted one from the other, the two systems are still based on somewhat different criteria. DIN speed is still measured sensitometrically at a point on the characteristic curve 0.10 above fog while the ASA speed is measured by the minimum useful gradient method. But the Germans have abandoned the idea of "optimal development," measuring the speed at the degree of development which gives maximum speed, and now recommend average development in a standard type of negative developer for film speed measurement. □

NEW EQUIPMENT

continued from page 68

duction of a new *f*/0.95 color-corrected 25mm lens, the Som Berthiot Cinor *f*/0.95. In a standard C mount, the lens will fit all standard C mount 16mm movie cameras. A companion lens, the Cinor *f*/1.15 RX fits the Bolex H-16 Reflex movie camera. Both are available through *Paillard, Inc.* Price: $205.

Press Tape Splicer 123

A movie-making accessory that makes dry splices on 8 or 16mm movie film has been announced by *Eastman Kodak*. The splicer cuts a notched section out of two frames and the two pieces of film are fitted snugly together. A backing strip is pressed against the film — matching sprocket holes — and the splice is made. Price: $6.95.

Film Tank Trio 124

One three compartment water tank and two 3½ gallon insert tanks fitted with floated covers are available from *Oscar Fisher Co.* as the film tank trio. They are all self-welded and made of 18 gauge stainless steel. The two insert tanks are for process solutions and fitted with light tight lids. The unit comes in sizes to accommodate standard cut film hangers in quantities from 6 to 24.

Silette-SL 125

A 35mm camera with which the user has only to ascertain ASA rating, point the camera in the general direction of the subject, and set a pointer in line with the exposure meter needle for automatic diaphragm setting has been introduced by *Agfa, Inc.* Once set, the Silette-SL automatically changes lens openings with changes in speed. The camera has an *f*/2.8 50mm Agfa Color-Solinar lens in a flash-synchronized Prontor SLK shutter with speeds from 1 second to 1/300. Lanthanum glass is used in the lens to eliminate the need for color-compensating UV filters. Price: $99.95.

Microskaner 126

A pocket-sized reader with long eye distance, fixed focus and sharp definition, the Microskaner, has been marketed by *Microreader Manufacturing and Sales Corp.* Both positive and negative microfilm are said to be readable in daylight or ordinary room illumination while microprint can be read by means of the continuous, intense, reflected light provided by two standard penlight batteries. The instrument is rested on the object to be read and both the material and reader are brought up to the eye. Eyepiece lens has a 1" diameter. Magnification up to 20X.

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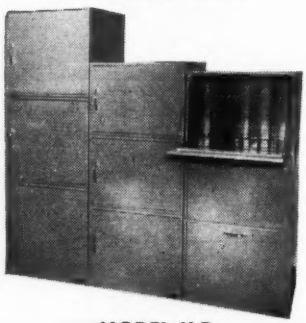

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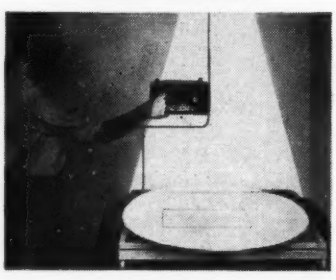

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. . . for more details circle 529, page 81

Microskaner is 6¾" long, 2" high and 1½" deep. Weight, without batteries, 1¾ oz., with, 2¾ oz. Price: $12.95.

High Speed Offset Press 127

A new hand-fed flat-bed offset press with automatic inking and dampening which operates at speeds up to 850 impressions per hour is being offered to U. S. lithographers by *Amsterdam Continental Types and Graphic Equipment, Inc.* Called the Kalle 17, the press features a refrigerated plate bed which provides automatic dampening through condensation of moisture. Other features include critical register control, even overall inking via a 3 form-roller inking system and a printing table that can be raised or lowered. The press accommodates a maximum paper size of 13" x 18" and a printing area of 12½" x 17½".

Duomatic 128

The new Duomatic from *Duophoto Corp.* copies material of any length and up to 24" in width. A special feature of the new unit is the ability to develop clearly defined blow-up of microfilm. The Duomatic is a positive, dry system reproducer which produces a black and white positive copy from any written, typed or printed original.

Aluminum Hub Reel 129

Compco Corporation announces a new type of film reel construction. Precision die-cast aluminum hubs combined with specially tempered steel reel sides are said to offer greater sturdiness and truer film running. Reels are available with the new construction from 800'-2000'.

Dual Power Magnifier Viewer 130

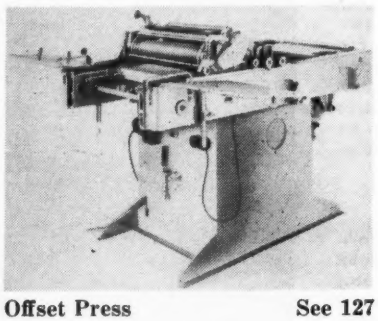
The turning of a control knob varies magnification from 8 to 16 power on *Pellegrini-Piek's* new dual power magnifier viewer for the Bolex Reflex camera. Any standard camera viewer can be converted to the magnification viewer. Conversion automatically increases field size from an original 6 power to an 8 power full field size. Additional increases can be regulated. Prices: $54 and $60.

Film Master Screen 131

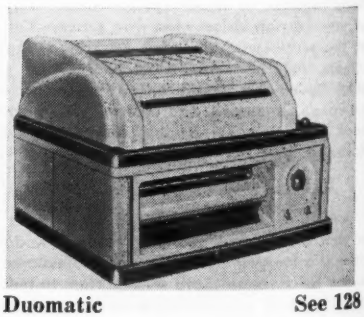
A new glass beaded projection screen available in eight sizes has been announced by *Radiant Manufacturing Corp.* The screen's surface is vyna-flect, a beaded surfacing said to be mildew and flame proof. The Film Master unit incorporates a hexagonal screen case, chrome plating, metal casing and automatic leg opening. In all square sizes the screen surface can be converted to oblong for motion pictures.

New Automatic Slide Projector 132

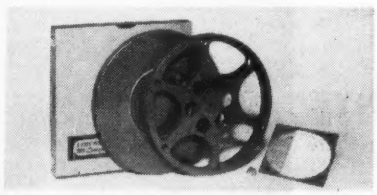
A new, automatic slide projector that offers three methods of advancing slides, the Cavalcade Projector, is being sold by *Eastman Kodak.* Slides may be advanced by automatic cycling with four, eight or sixteen second intervals, by power change, or by manual advance. Other features include pre-conditioning slides before projection via a warm air draft, steel slide protectors, a choice of 500 or 300 watt illumination by means of a selector switch, a movable pointer that superimposes an arrow silhouette over the projected image



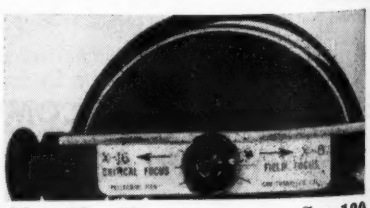
Offset Press See 127



Duomatic See 128



Aluminum Reel See 129



Magnifier Viewer See 130

and a five-inch *f*/2.8 Ektanon lens. Price: $149.50.

Angenieux Zoom Lens 133

A new zoom lens for the 16mm industrial photographer has been developed by *Bell & Howell.* With a maximum lens opening of *f*/2.2 and a minimum of *f*/22, the Angenieux zoom has a 4-to-1 range of focal length variation. A zoom handle provides constant control of focal length. The lens will focus down to 18" and is ring calibrated for distances from 48" to infinity. Viewfinder is reflex, through-the-lens type. Lens fits most standard C-mount cameras. Price: $429.95.

Keyboard Perforator 134

A keyboard instrument designed for automatic color motion picture printing operations is available from *Fish-Schurman Corp.* It has 32 characters, all of which are automatically coded for 5 hole punched tape. After striking a key, corresponding to the desired character, the space bar is pressed causing the perforator to provide the corresponding code hole in the tape. Depressing the space bar also operates a counter. The instrument is particularly useful for the automatic selection of scene to scene exposure vales, permitting 32 steps for each color, red, blue and green.

Super Anscochrome 135

Super Anscochrome, from *Ansco,* is now available in 16mm, 35mm and 70mm daylight and tungsten types for motion picture cameras. It is a positive color film of high speed highly suitable for available light work. Its exposure index is 100 but can be processed at higher speeds.

750-watt Showtime 8 Projector 136

Big screen projection for home or office movies is made possible by *Eastman Kodak's* new 750-watt Showtime 8 projector. A ¾-inch focal length *f*/1.6 lens provides five-foot wide "big screen" projection in average-size rooms. The projector includes convenient reel arms that fold in or out and a receptacle for storing two 400' reels. An integral part of the projector unit is a new Press Tape dry splicer. Price: $174.50.

Self-Inker 137

Pryor Products' new No. 06 heavy duty self-inker employs a nylon swivel gear to reduce wear of the inker's only working part. No. 06 takes a rubber die ¾" x 2½" long and has a removable ink pad. It is made of cast brass plated with chrome and has a plastic handle pinned to the frame. Price: $11.50.

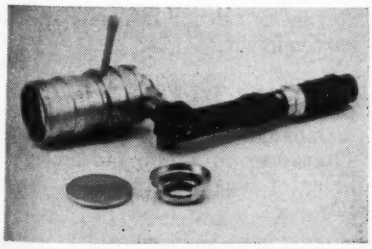
D-35 Starlight Tripod 138

A lightweight tripod designed especially for 35mm, 2¼" sq. and 8mm movie cameras has been issued by *Davidson Mfg. Co.* Weighing less than 2¼ lbs., the tripod folds to 21" and extends to 58½". The camera base is designed to fit all small cameras and has a swing-over feature which permits instant changing from a vertical to a horizontal format. Finish is satin with an enameled trim.

Magnetic Film Recorder 139

Light weight and portability are featured in the first of a new line of *Kinevox-Hallen* magnetic film recorders. Model 616 is light weight and complete in one case. Weight and power consumption are reduced by having the takeup and rewind reels powered by clutches from the drive gear. Film speed is 36 ft. per minute, standard 16mm sound speed, 800' film capacity.

Each new product item listed here has a key number. For more information on the subject, circle the same number on the Readers Inquiry Card, page 81.



Zoom Lens See 133

Keyboard Perforator See 134

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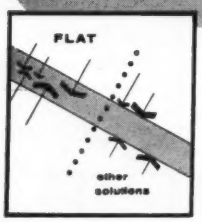

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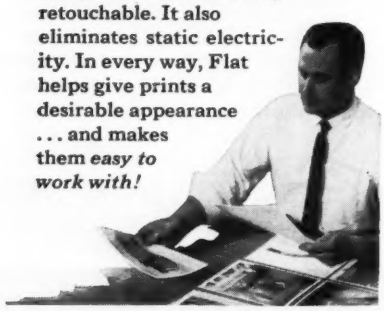

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. . . for more details circle 611, page 81

New Free Literature

Keep posted on the latest developments in the photographic field. Each new product and supply item featured below has a key number. If you want more information on the subject — without any obligation — circle that same number on the Readers Inquiry Card on Page 81.

MICROFILMING

New Horizons with Microfilm **201**
Filmsort, Inc. 19 pp. Booklet telling how individualized filing of film in cards opens new vistas for documentation.

Dry Process Equipment **202**
Kalvar Corp. Details on microfilm enlargers and cameras and roll to roll printers. Chemical processing not required.

Microfilm Service **203**
Microdealers, Inc. Folder giving details of nationwide coverage which includes microfilming of engineering drawings, public records, medical, x-ray.

70mm Statfile Recorder **204**
Photostat Corp. Literature on unit combining microfilm camera and projector for recording, storing and projecting documents up to 3⅓′ x 5′.

Vidifile Microfilm Jacket **205**
Microfilm Jackets, Inc. Folder on best jacket for your needs. Gives specifications and qualities of different styles.

Microtape Filing Systems **206**
Microtape Systems. Flyer on practical low cost filing systems for setting up active records in unitized microtape form.

Atlantic X-Ray Projector **207**
Atlantic Microfilm Corp. Flyer on 35mm X-ray microfilm reader-projector for individual comparisons or for large-audience viewing.

Continuous Roll Contact Printer **208**
Photo Devices, Inc. Data sheet on unit accepting 16mm, 35mm and 70mm film. High actinic mercury vapor light source equips it for printing Microprint paper.

Microfilm Printer **209**
Oscar F. Carlson Co. Information on unit designed to print perforated and non-perforated 35mm or 16mm b&w film.

Universal Reader **210**
Documat, Inc. Detailed information about the microfilm reader for both roll film and unitized film.

Micro-Master 105mm **211**
Micro-Master, Inc. 4 pp. Photos and specifications on equipment for setting up a 105mm system.

Microfilming Services **212**
Circular outlining advantages in microfilming records and documents of all kinds.

Preserving Newspapers **213**
University Microfilms. 8 pp. Booklet listing microfilm services available in making record of newspapers. Description of equipment and services.

Griscombe A-2 **214**
Griscombe Products. Details on microfilming documents up to 36″ x 47″ with power driven and reduction planetary camera.

Index Tabs **215**
Sertafilm, Inc. Information on full index tab for drawing or data card number.

Automatic Tri-Film Processor **216**
Canadian Applied Research Ltd. Literature on a film processor capable of handling 16, 35 or 70mm film.

Microcards **217**
The Microcard Corp. 14 pp. Illustrated survey of what this important industrial tool is and can do.

Temperature Control **218**
Hills Mfg. Co., Inc. Data on Tem-Matic temperature control. For color or b&w processing.

Micromatic Reader **219**
Ozalid Div. Data on unit producing stabilized silver halide photo copies up to 18″ x 24″. Screen size 24″ x 36″.

Microfilm Reader **220**
Erban Products, Inc. Flyer on enlarged version of portable reader for micro-records of newspapers, financial records, maps.

Film-a-record Model 8 **221**
Remington Rand. Folder describing portable microfilm camera accepting material up to 12″ wide.

Underground Vault Storage **222**
Iron mountain Atomic Storage Corp. Information on storing of your vital microfilmed records in underground vault.

INSTRUMENTATION

Astronomical Telescopes **224**
Unitron Instrument Division. 40 pp. Descriptive catalog and observers guide on choosing and using telescopes and accessories.

Instrumentation Cameras **225**
Traid Corp. 6 pp. Data on high-performance cameras and accessories for industrial use.

Kth 57 Cine Theodolite **226**
Perkin-Elmer Corp. 8 pp. Brochure describes performance and specifications of Kth 57 cine theodolite for ballistic and missile photography.

Spectra Instruments **227**
Photo Research Corp. Illustrated, two-color leaflet listing variety of meters, filters, densitometers, meter testers. Also calibration services.

VIEWERS, PROJECTORS, SCREENS, SLIDES

Stereo Slide Protection **228**
Emde Products, Inc. Folder describing self-aligning, self-locking aluminum masks and frame. Three stereo window sizes.

Free Slide Rule **229**
Projection Optics Co. Determines screen size, projection distance and focal length of lens required for overhead or opaque projector.

Stereo Photography **230**
Realist, Inc. Illustrated case histories of firms—engineering, interior decorating, manufacturing, etc.—making functional use of stereo photography.

Rear Projection Screen **231**
Television Equipment Co. 4 pp. Features of new transparent Lenscreen include high contrast, depth of color and sharpness of detail. Shows pictures anywhere.

Outdoor Projection **232**
Genarco, Inc. 8 pp. Brochure on projecting images 20′ to 40′ wide outdoor on white walls or translucent screens with 3,000 watt slide projectors.

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. . . for more details circle 593, page 81

Film Cutters **233**
Richard Mfg. Co. Brochures on Lutes semi-automatic 35mm and stereo film cutters. Automatic film transport.

Esco Slide Accessories **234**
Erie Scientific Corp. Protecting transparencies with fibreboard and glass, or aluminum and glass slide binders. Free sample.

Stere-O-Card Viewer **235**
Ft. Pierce Industries. Promotion kit on merchandising your product with 6-picture 3-D viewer.

DARKROOM SUPPLIES, EQUIPMENT, X-RAY

Photo Papers & Chemicals **236**
The Haloid Co. 12 pp. Two-color brochure on photo papers and chemicals. Benefits of various papers and processing combos.

Print Flattening **237**
Upson Chemical Corp. Information on solution which prevents curl by penetrating print paper. Retouching unhindered.

Automatic Color Processor **238**
Reel E-Z Corp. Details on load-it-and-leave-it unit. Interchanges from roll to sheet film and paper.

Automatic Film Dryer **239**
Philadelphia Air Transport Co. Data on unit featuring high velocity filtered air blower. Thermostatically controlled heat.

Print Dryers **240**
Camera Craftsmen. Illustrated data and price list on complete line of photo print dryers.

Ultra-Fine Grain Developer **241**
George Murphy, Inc. Information on Promicrol developer and replenisher. Wide range of sizes.

Type C Print Processor **242**
Rolor Industrial Corp. Technical data on unit featuring gas agitation system and temperature maintenance.

Photo Developing Trays **243**
American Hard Rubber Co. Data on trays and tanks. Chemically inert materials impervious to photo chemicals and cleaners.

X-ray Film Processor **244**
Brown-Forman Industries. Booklet on automatic X-ray film processor and isothermal dryer. Processes and dries in eight minutes.

Print Dryers **245**
Johnke Mfg. Co. Circulars on firm's print dryers and on the "Jamaco" power printer.

X-ray Film Processor **246**
Houston-Fearless Corp. Description of automatic processor which operates on 110 volts. Load capacity 80.

Focusing Device **247**
R. P. Cargille Labs. 4 pp. How to use See-Sharp device on enlarger easel. Brighter, magnified images.

CAMERAS, LENSES, ACCESSORIES

Lenses & Accessories **249**
Elgeet Optical Co., Inc. 24 pp. Illustrated brochure gives specifications of 8mm and 16mm wide angle, standard, and telephoto lenses and other accessories.

Angenieux Lenses **250**
Exakta Camera Co. Illustrated brochure listing entire line of Angenieux lenses—normal, telephoto, wide angle.

Travegon **251**
Agof-Schacht Lens Corp. Data on lens for Exakta, Praktica, Pent-

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acon. Automatic diaphragm with 65° angle of view.

Trick Photography 253
Davis & Sanford Co. 2 pp. Special effects with "3V" Tri-Vision device. Fits most still and movie camera lenses.

CINEMATOGRAPHY

Precision Cine Repairs 254
Camera Service Center. Description of professional repairs on 16 and 35mm motion picture cameras, studio equipment. Lens mounting, calibrating, TV stopping.

One Stop Service 255
Douglas Productions. 12 pp. Price list also includes information on motion picture procedures, glossary of printing terms.

Movie Duplication 256
Hollywood Movie Labs. Data on duplicating services. 8mm or 16mm duplicates; 8mm enlarged to 16mm; 16mm reduced to 8mm.

The Professional Touch 257
Fax Film Service. Descriptive literature on services which include art, titling, animation, editing and sound, scripting and planning.

Motion Picture Services 258
Cine-Video Productions, Inc. 16 pp. Booklet detailing complete motion picture services from "script to screen."

Square Film Container 259
Jack C. Coffey Co. Flyer gives prices, data on 16mm square container—stacks like a book. Easier to package for shipping.

Rental Equipment 260
Birns & Sawyer. Catalog of complete motion picture equipment. Includes the Aquarri, underwater housing, for 16mm Arriflex.

Sound Cameras 261
Television Specialty Co., Inc. 1 p. Auricon camera modifications including data on the TVR shutter modifications for kinescope recording.

Film Editing 262
Ross-Gaffney, Inc. Listing of services: magnetic music library, original music scores, magnetic-optic FX library.

Music For Film 263
Thomas J. Valentino Inc. Catalog of high fidelity records of background music for company films. Also "Tips on Turntables."

LIGHTING

How Come No Flash 264
Westinghouse Electric Corp. Reviews common cause of flashbulb

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The Readers Inquiry Card to the right and its duplicate on the other side of this page work as follows:

➤All advertisements are keyed. For additional information simply circle that key number in the "Advertisements" section of the card. Information will be forwarded by the advertiser.

➤The "New Equipment & Materials" section of the card lists numbers for new items described in this issue. Circle the number in which you are interested. Information will be mailed promptly and free of charge.

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NEW FREE LITERATURE

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ADVERTISEMENTS

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504	519	534	549	564	579	594	610	626	642	658	674
505	520	535	550	565	580	595	611	627	643	659	675
506	521	536	551	566	581	596	612	628	644	660	676
507	522	537	552	567	582	597	613	629	645	661	677
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512	527	542	557	572	587	602	618	634	650	666	682
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failure such as poor socket contacts, tarnished bulb base, etc.

Fotoeye 265
Heiland Division. Illustrated brochure on the operation of the photoelectric device for extension flash.

GRAPHIC ARTS AND REPRODUCTION

Wesel 25 Camera 266
Wesel Mfg. Co. Data on process camera unit mounted on 3-point vibration-absorbing mounts. Copy holder is 30" x 40".

Graphic Arts Tools 267
Griffin Mfg. Co. 16 pp. Photo illustrated catalog giving data, prices on precision built tools for photo and etching work.

Graphic Arts Materials 268
Consolidated Photo Engravers. Bulletin on cameras, lenses and printers available for graphic arts department.

Lighting Equipment Designed to 7500°K Standard 269
Macbeth Corp. 4 pp. Technical bulletin outlines requirements of "New Graphic Arts Standard" in lighting for color matching and color quality control.

Transcopy Duplex 270
Remington Rand. Illustrated folder explaining the use of the new machine that produces photocopies of any record.

BOOKS

Books on Photography 271
Mole-Richardson Co. Pamphlet on classics that should be on every industrial photographers reading list.

SERVICES

Reversal Process 272
Kin-O-Lux Inc. Literature covers reversal developing, prints and reversal prints color to b&w.

Color Slide Reproduction 273
Volmr-Allen. Color slides reproduced in full color by offset lithography. Complete price list and samples.

Reversal Process 274
Video Film Lab. Data on complete 16mm laboratory service using reversal process. Special attention to Fastax developing.

Reversal Processing 275
Lab-TV. Circular giving details on 16mm black and white reversal processing. Fastax specialists.

MISCELLANEOUS

Film Protection 276
Vacuumate Corp. 4 pp. Film conditioning treatment reacting on emulsion offers permanent resistance to damage.

Background Papers 277
Lloyd Showroom. Information on background and flooring papers. Many lines not found elsewhere.

FilMagic Pylon 278
Distributor's Group, Inc. Unit cleans and lubricates tapes and films while they play.

Safe Film Preserver 279
Permafilm Inc. Folder on film preserver which acts as a stabilizer and anti-static agent.

Photography for a Profitable Career 280
New York Institute of Photography. 36 pp. Explanation of the various fields of photography and their opportunities. Illustrated.

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continued from page 70

was placed before the incandescent source to cool the beam.

The operation of taking a picture was as follows: with the incandescent illumination the slide was scanned until a suitable specimen was found. The binocular was removed from the microscope and a 35mm camera with photomicrographic attachment with its beam splitter was substituted. Then the continuous Light Adapter was turned on and the mirror in the T-tube turned to permit the light from the continuous discharge of the flash tube to illuminate the subject for final focusing and centering. When the microscope subject appeared best, the continuous discharge was turned off, the camera shutter opened, and a single flash at full power was set off to make the exposure.

Enlarge To 5 x 7

To utilize all the fine detail this exposure of 1/1500th of a second provides, Adox KB-14 film is used. The negatives are well exposed, producing optimum density to achieve maximum contrast in the membranes under study. These negatives are enlarged to 5 x 7 prints for reproduction. Experiments with larger size films are being made because there is enough light to expose a much larger area than 35mm film. With larger film even more detail is expected to become apparent. Anscochrome pictures have been made with the same equipment.

Compare an exposure of 1/1500th of a second to the 1/25th second, the fastest it is possible to make with an arc lamp. With such a long exposure the moving membranes blur into an indistinct gray shadow, totally unlike their structure as the eye sees it. The electronic flash has made the difference between a worthless blur and a valuable, meaningful record. □

Articles on topics ranging from aerial to x-ray photography are listed in the new 1957 INDUSTRIAL PHOTOGRAPHY Index. A limited number of indexes from previous years is also available. Requests for all copies should be made on company stationery.

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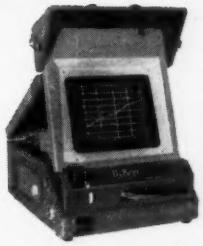

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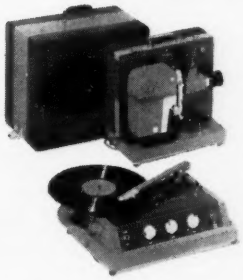

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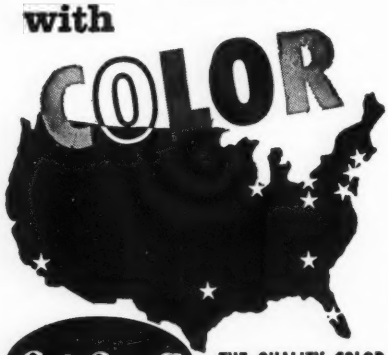

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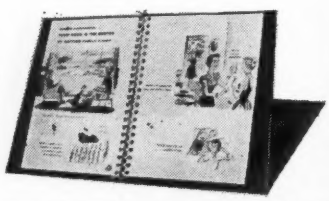

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. . . for more details circle 513, page 81

IP ARTICLE NEWS SPEECH PHOTO } Briefs

AIR FORCE USES AUTOMATIC AERIAL CAPTION WRITER

A new invention, IT&T's Digital Data Recording Device, records position, altitude and other data in coded-dot form directly onto aerial reconnaissance photos (lower right). During the film's development, a reader decodes and prints the data beneath the picture (bottom).

Store and Send Photos on Tape

A new tape recorder, developed by Ampex Corp., records signals from standard facsimile wirephoto machines. Once the signals are on tape they can be played onto a facsimile printer or sent to other tape recorders. By recording and sending photos on tape, loss of quality in successive transmissions is said to be eliminated.

High-Speed Photography

Volume six of the Society of Motion Picture and Television Engineers' reprint series, devoted to high-speed photography, has just been published. It contains papers on the subject which have appeared in the Society's Journal since 1954. The new volume, with 27 articles and an index, is available from the society at $3.50 a copy.

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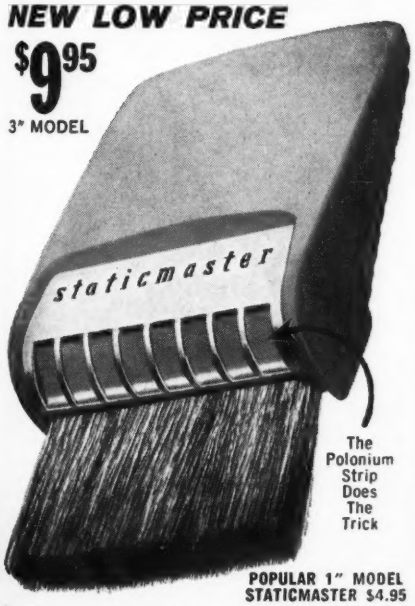

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. . . for more details circle 582, page 81

Optical Industry Directory

Now available for general distribution at $5.00 per copy is the 1958 Optical Industry Directory. Contents of the 292-page volume include a listing of American optical sources, an item index of optical products and services and a rundown of commercially available corrected lenses (American and foreign). An added feature is a listing of optical industry personnel and their company affiliations.

TV To Guard Museum

A battery of closed-circuit television cameras is helping to patrol the Cleveland Museum of Art. Thirty-three cameras feed pictures into a guard-room control panel. Above the panel are eight receivers that can be switched around to cover any sequence of galleries at night. For added protection, microphones in each gallery can be turned up to report the slightest noise.

Medical Film Workshop

The Second Medical Motion Picture Workshop will be held at the Calvin Company, Kansas City, Mo., on April 15, 16 and 17. The course will be in basic film production and center around editing. Total attendance is limited to 150 with tuition set at $60.

Micrography for Small Parts

Photo-micrography plays an important part in the checking of small parts at Kodak's A&OD Chemical laboratory. Under metallurgical microscopes, metallic parts are magnified up to 3,000 times so that researchers can even see the "grain" of the part in question. The physical composition of the part is scrutinized and then photographed for record purposes.

Intercoms in Darkrooms

Ford photographers at work in the auto company's Dearborn, Mich., darkrooms are summoned to new assignments via intercom, far wall.

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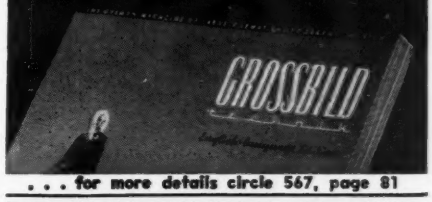

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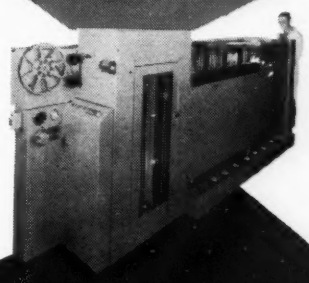

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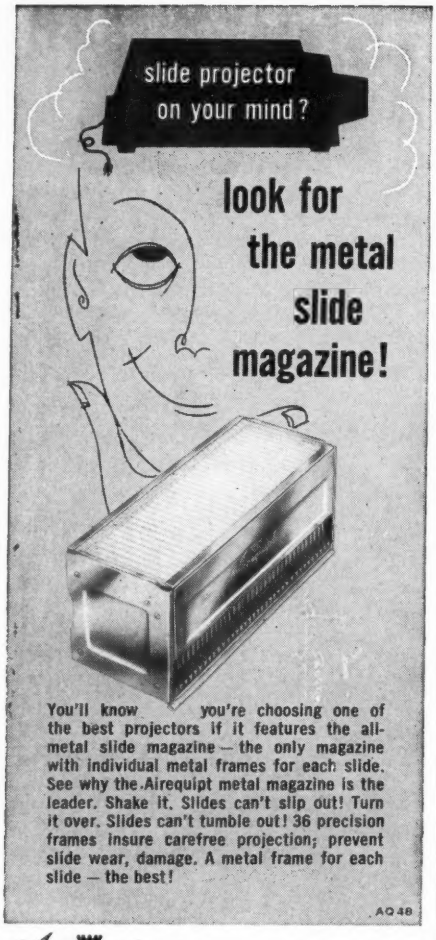
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WHAT'S NEW

continued from page 35

The Ozalid Division of General Aniline & Film Corporation has announced a new unit called the Micromatic, which will produce images up to 18" x 24" in size and has a screen size of 24" x 36". It produces conventional silver halide photographic copies which are stabilized; that means, they are not subjected to a proper wash and, therefore, the images are not permanent.

A similar unit has been developed by the Griscomb Corporation and is presently distributed by the Remington Rand Corporation. This unit has an opaque screen 17" x 22" in size and will produce from individual filmsort cards a 17" x 22" size print of conventional silver halide, also stabilized. The Photostat Corporation has developed a similar unit for the armed forces.

XEROX COPY FLO

The Haloid Company has completed a new machine for the armed forces called the Xerox Copy Flo model #24. It permits the reproduction of 24" wide documents from either aperture cards or 35mm roll film. This unit employs electrostatic photography and produces completely dry and permanent prints in a matter of seconds at a rate of 20' per minute. This model will be commercially available in the near future.

The Radio Corporation of America has developed a new process called Electrofax and has licensed a great number of organizations interested in its development.

The 3M Company recently announced their 3M Print Reader. This machine employs a special laminated paper and produces via electro-chemical reaction a permanent print from microfilm within 10 seconds.

Ozalid has developed a microfilm duplicator which will produce from a roll of microfilm transparency sheets up to 6½" x 8" in size, thus converting roll film into card form.

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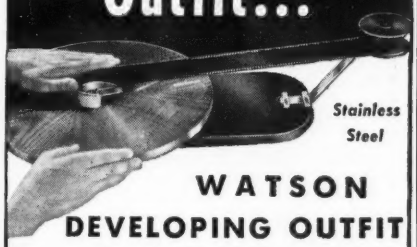

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This unit is called the Actifilm Printer and permits printing from any roll film up to 35mm wide.

The Filmsort Division of Dexter Folder Company has developed a film duplicator called the Uniprinter which permits the duplicating of film images inserted in Filmsort aperture cards at a rate of two prints per minute. This unit employs a relatively new principle called Kalvar or, together with an ammonia developing attachment, Diazo film. The Kalvar film is exposed through ultraviolet light and developed by heat.

Presently Eastman Kodak and duPont are preparing new film emulsions or film bases for microfilm use which will produce better film images.

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Microlex has completed a unique reproduction machine which combines the ability of reproducing by way of Electrofax readable-size copies from original documents, microfilm and micro-opaques. In a matter of 35 seconds it automatically produces dry and permanent copies. It is planned that the unit will be available in various modifications by the end of this year.

There is a great amount of activity in the microfilm industry, particularly in finding new applications. Every time a new application has been found, there is of necessity a new method or a new piece of equipment required to make this new application easier, simpler and more automatic. □

INDUSTRIAL PHOTOGRAPHY'S 1957 author-subject index is now ready for distribution and will be made available without charge to those writing in on their companies' letterheads. Entries range from aerial to x-ray photography.

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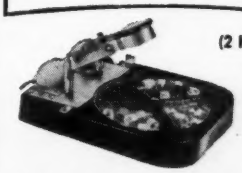

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MAKING PRINTS

continued from page 37

reader-printer employing an electrolytic printing process which delivers a complete 8½" x 11" print from the frame selected on the reader screen in less than ten seconds. Remington-Rand is now offering a reader - enlarger - processor combination which will deliver stabilized, damp-dry prints up to 17" x 22" in size in 90 seconds.

Micro-opaques

Another similar and somewhat knottier problem frequently occurs wherever micro-opaques are used: How to get a readable enlargement from the screen of a micro-opaque reader. The Readex Microprint Corporation recently demonstrated a prototype model of a reader-printer which produces enlargements from micro-opaques in two to three minutes via an adaptation of the Electrofax process. This reader-printer is not yet on the market.

These new methods of printing from microfilm have done much to extend the usefulness of microfilm in countless applications, but much still remains to be done. As more and more of the documentary records of the present and the past are converted to microform, there is a continuing need for simpler, better, faster and cheaper methods of obtaining permanent, high-quality readable-size facsimiles when they are needed and where they are needed. □

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MISCELLANEOUS

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Nickle-Plating Pitting

A silver medal has been awarded to William M. Tucker and Frank O. Beuckman of Kodak Park Works by the American Electroplating Society for their paper, "Dissolved Gases in Plating Baths." It examines the problem of pitting from gases in solution, particularly in heavy nickle plating.

Camera Antiquities?

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Kodak Appointments

Three executive appointments in the Kodak Research Laboratories have been announced.

They are: Dr. Julian H. Webb, head of the physics divisions; Dr. George C. Higgins, associate head of the physics division; and T. Gentry Veal, an assistant head of the physics division.

Mr. John L. Tupper continues as an assistant division head, with increased responsibilities.

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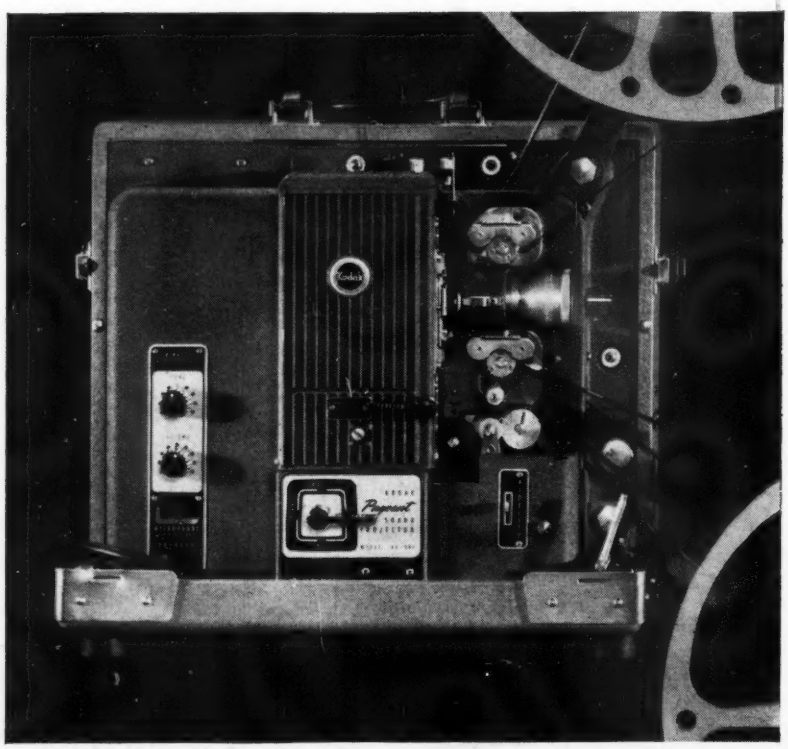

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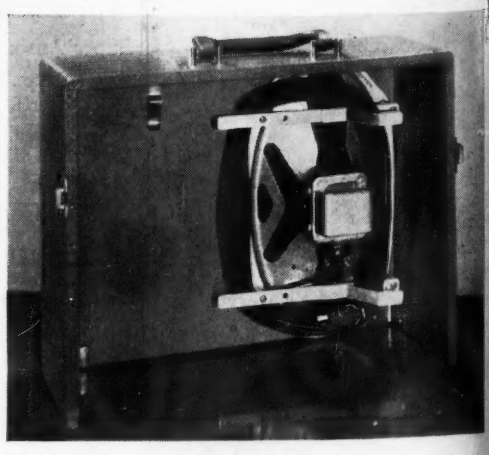

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